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Mitigation Options for the Impacts of New Permit-Exempt Groundwater Withdrawals

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by
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Abstract/Executive Summary

Will be included in final report.

Background

Legislative interest and purpose for this report

The Department of Ecology is responsible for managing the use of the state's waters in a manner consistent with water resource policy set forth in Chapter 90.54 RCW, the Water Resources Act of 1971. The Act states the intent of water resource management strategies are to supply water in sufficient quantities to satisfy three water resource objectives:

(1) Providing sufficient water for residential, commercial, and industrial needs;

(2) Providing sufficient water for productive fish populations; and

(3) Providing sufficient water for productive agriculture.[1]

To meet the multiple competing needs of water, Ecology's practice had been to use Overriding Consideration of the Public Interest (OCPI) as justification for reserving water for new out-of-stream uses that would impair adopted instream flows. On October 8, 2015 the Washington State Supreme court ruled in *Foster v. Department of Ecology* that Ecology may not use its Overriding Consideration of the Public Interest (OCPI) authority in RCW 90.54.020(3)(a) to issue permanent water rights that impair regulatory instream flows.

This ruling further constrains Ecology's ability to adopt instream flow rules that provide water for both instream and out of stream uses, which was already restricted since the 2013 State Supreme Court ruling in *Swinomish* Indian Tribal Community v. Department of Ecology. The Supreme Court ruled in *Swinomish* that Ecology's approach relying on OCPI for balancing competing uses of water was not consistent with the law. Since then, Ecology has been assessing how it can best meet its competing water resource management mandates and stay within the restrictions identified by the court.

In 2015, the state Legislature introduced SB 5965 that would have required Ecology to prepare a report evaluating options for mitigating the impacts of permit-exempt groundwater withdrawals on base flows and minimum instream flows. The proposed legislation called for:

- An assessment of the effectiveness of each type of mitigation technique, including out-of-kind mitigation techniques, which may be available to the department of ecology to mitigate the impacts of permit-exempt groundwater withdrawals on base flows and minimum instream flows. (SB 5965 Sec 2 (1)(f))

- A survey of in-kind streamflow enhancement strategies, other than regulation of permit-exempt groundwater withdrawals, that would improve streamflow levels in a cost-effective manner. (SB 5965 Sec 2 (1) (e))

[1] RCW 90.54.005

- A description of mitigation techniques the department of ecology has employed in the last ten years to mitigate the impacts of permit-exempt groundwater withdrawals on base flows and minimum instream flows, including a discussion of out-of-kind mitigation techniques, and addressing the location, cost, and legal authority for each type of mitigation technique. (SB 5965 Sec 2 (1) (c), (d))

- An evaluation of all mitigation options that may be available for permit-exempt groundwater withdrawals in the areas covered under the instream resources protection program for the lower and upper Skagit river basin, water resource inventory areas 3 and 4, and a discussion of the advantages and disadvantages of employing each type of mitigation technique in those areas.[2] (SB 5965 Sec 2 (1) (g))

- An examination of scientific methodologies for establishing base flows and minimum instream flows, including a discussion of methodologies regularly used by the department of ecology. (SB 5965 Sec 2 (1) (a))

- An analysis of whether requiring mitigation for new permit-exempt groundwater withdrawals would in fact result in meeting base flows or minimum instream flows. (SB 5965 Sec 2 (1) (b))

- Recommendations for legislative action to ensure reasonable mitigation options, including out-of-kind mitigation techniques, will be available to landowners who are required to mitigate the impacts of permit-exempt groundwater withdrawals on base flows and minimum instream flows. (SB 5965 Sec 2 (1) (h))

The House of Representatives Agriculture and Natural Resources Committee, proposed additional topics to include in the report: a broader discussion of alternative water supply options for new rural water use that do not rely on mitigation; and an analysis of the impacts of permit-exempt withdrawals on tributary streams. The Legislature failed to pass SB 5965 during the 2015 session. However, Ecology saw value in promoting a greater shared understanding of water resources mitigation among state policy makers.

This report evaluates a range of options for mitigating the impacts of permit-exempt groundwater withdrawals on instream flows. Ecology acknowledges that some of the mitigation techniques described in this report may not be viable under the *Foster* decision.

This report includes:

- Background information about instream flow protection, permit-exempt withdrawals, what is meant by mitigation, and the legal authority for mitigating permit-exempt groundwater withdrawals.

[2] For more information about water resources management in the Skagit watershed see Ecology's webpage at http://www.ecy.wa.gov/programs/wr/instream-flows/skagitbasin.html

- Information about mitigation needs for permit-exempt withdrawals, and how mitigation is evaluated.

- The options available for mitigating the impacts of permit-exempt groundwater withdrawals on instream flows.

- A description of mitigation measures that have been used by Ecology.

- A description of mitigation and alternative water supply options that are available or being developed for the Skagit River basin.

- Information on the effects of permit-exempt withdrawals on instream flows.

- A review of instream flow setting methodology.

- Recommendations.

Consistent with the intent of SB 5965, this report focuses on water resources mitigation for permit-exempt withdrawals. Limited attention is devoted to discussing mitigation associated with the water right permitting process. For more information on mitigation requirements associated with permitting refer to Ecology Water Resources Policy 2035.

Instream Flow Protection in Washington State

Instream flow protection has been part of Washington State Law for over 65 years. The state's Water Flow Policy, adopted in 1949, states: "It is the policy of this state that a flow of water sufficient to support game fish and food fish populations be maintained at all times in the streams of this state." (RCW 77.57.020, formerly RCW 75.20 050)

Ecology's program to adopt instream flow protection in rules began in the 1970s after the enactment of the Minimum Water Flows and Levels Act, Chapter 90.22 RCW, in 1967, and the Water Resources Act of 1971, Chapter 90.54 RCW.

Further expression of the state's interest in managing water resources to balance instream resource protection and future out-of-stream water use came with the 1997 enactment of the Watershed Planning Act (WPA), Chapter 90.82 RCW. Through the WPA, the state invested funds in local planning units to develop Watershed Management Plans to ensure the wise use of the state's water resources, "by protecting existing water rights, by protecting instream flows for fish, and by providing for the economic wellbeing of the state's citizenry and communities."[3]

[3] RCW 90.82.010

The instream resources that are designated for protection in state statutes[4] include fish, game, wildlife, scenic, aesthetic and other environmental values, navigational values, birds, and recreational values. Ecology has typically relied on assessment of fish habitat to determine instream flow levels that will protect fish and the other instream resources designated for protection. However, some interest groups disagree with this method and have argued for higher instream flow levels for recreational or aesthetic purposes.

Ecology has adopted 23 water resource management rules establishing instream flows, and in some cases closures, for rivers and streams in 26 watersheds. In addition, rules have been adopted establishing instream flows for the main stem of the Columbia, and Spokane rivers. Instream flows adopted into rule since 2000 specify that instream flow restrictions apply to all new uses of water—including permit-exempt groundwater withdrawals that are in hydraulic continuity with the surface water body.

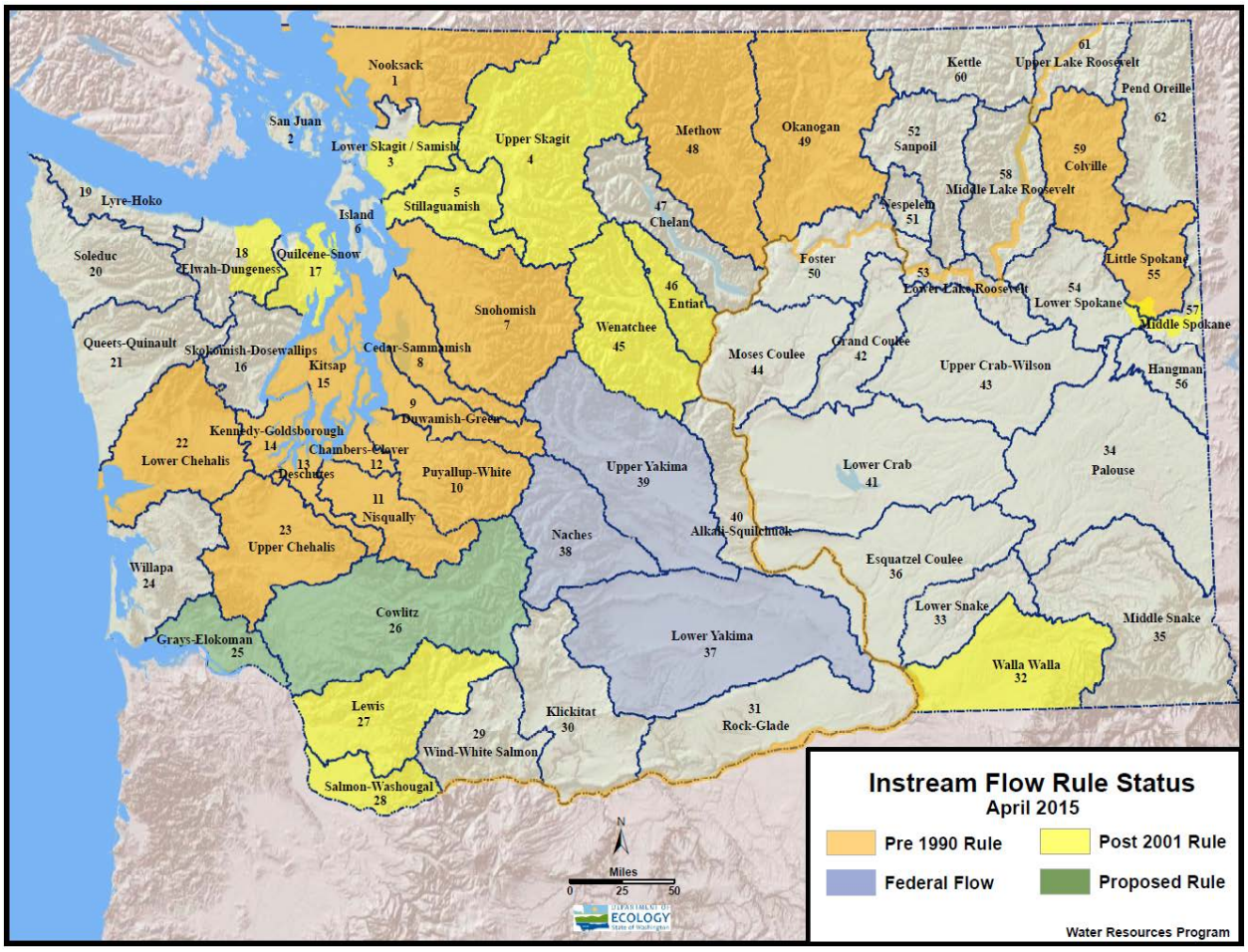

Figure 1. Instream flow rule status in Washington State

[4] RCW 90.54.020(3)(a) and RCW 90.22.010

Permit-exempt withdrawals of groundwater

RCW 90.44.050 allows groundwater to be used in limited quantities without first obtaining a water right permit from Ecology. The purpose of this groundwater exemption is to minimize the administrative burden on prospective water users and on Ecology for these small water uses. While permit-exempt wells are exempt from the requirement to obtain a permit before using water, the uses are still subject to the priority system established for water rights in our state. The exceptions to the permit requirement are for withdrawals of groundwater for:

- Providing water for a single or group domestic use (limited to 5,000 gallons per day).
- Watering up to one-half acre of non-commercial lawn or garden.
- Providing water for livestock.
- Providing water for industrial purposes, including irrigation (limited to 5,000 gallons per day but no acreage limit).

Numerous studies in this state have shown that most withdrawals of groundwater are connected to some extent to surface water bodies. The interconnection between groundwater (aquifers) and surface water sources is known as hydraulic continuity. Hydraulically connected groundwater and surface water cannot be considered as independent resources. A withdrawal from one will have some effect on the other.

The groundwater statute, Chapter 90.44 RCW acknowledges interconnection between groundwater and surface water with the following provision:

> RCW 90.44.030 – Chapter not to affect surface water rights:
>
> *The rights to appropriate the surface waters of the state and the rights acquired by the appropriation and use of surface waters shall not be affected or impaired by any of the provisions of this supplementary chapter and, to the extent that any underground water is part of or tributary to the source of any surface stream or lake, or that the withdrawal of groundwater may affect the flow of any spring, water course, lake, or other body of surface water, the right of an appropriator and owner of surface water shall be superior to any subsequent right hereby authorized to be acquired in or to groundwater.*

What is mitigation?

Ecology's Water Resources Program policy on evaluating mitigation plans for new water right permits (POL-2035) defines mitigation as:

> *Measures that offset adverse impacts on a water source to eliminate impairment and/or detriment to the public interest.*

A broader definition of mitigation is found in the regulations of the U.S. Council on Environmental Quality (CEQ). The CEQ regulations for implementing NEPA at 40 CFR Section 1508.20 state that mitigation includes:

> *(a) Avoiding the impact altogether by not taking a certain action or parts of an action.*
>
> *(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*
>
> *(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.*
>
> *(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
>
> *(e) Compensating for the impact by replacing or providing substitute resources or environments.*

The Courts have helped shape Ecology's perspective on mitigation. The Washington State Supreme Court ruled in *Postema v. Pollution Control Hearings Board, et al* (2000) that withdrawals of groundwater in continuity with surface waters can have no effect on closed surface water bodies, and that if there is a regulatory instream flow in place that Ecology may use new information and scientific methodology to determine if a withdrawal will impair regulatory flows. Although the Court held that hydraulic continuity alone with surface waters with regulatory flows is not sufficient to establish impairment of that right, the Court did hold that if a withdrawal would impair surface water flows that an application must be denied. This decision has largely driven the need to mitigate for new permit-exempt groundwater withdrawals when those uses impair instream flows.

The Supreme Court ruling in *Swinomish v. Ecology* also affirmed that "a minimum flow set by rule is an existing water right that may not be impaired by subsequent withdrawal or diversion of water from a river or stream." Under the recent Supreme Court decision in *Foster* some of the mitigation strategies described in this report may no longer be viable options.

Ecology's authority to accept mitigation plans developed in support of water right permit applications is found in case law and statute.

- Mitigation plans may be submitted to propose compensatory mitigation within a watershed under Chapter 90.74 RCW.

- Ecology must consider both the benefits and costs, including environmental effects, of any water impoundment or other water management technique that is included as a part of the application under RCW 90.03.255 or RCW 90.44.055.

- Case Law includes: PCHB 05-137 Squaxin Island Tribe v. Miller Land & Timber; PCHB 97-146 OHA v. DOE and Battle Mt Gold Company; PCHB NO. 03-155 Burke and Coe v.

DOE; and Mountainstar Resort Development LLC; PCHB NO. 01-160 Airport Communities Coalition v. Ecology & Port of Seattle; PCHB NO. 02-037 Pacific Land Partners LLC v. DOE; PCHB 03-030 Yakama Nation v. DOE; PCHB 96-102 Manke Lumber Co v DOE.

SB 5965 requested an analysis of whether requiring mitigation for new permit-exempt groundwater withdrawals would in fact result in meeting base flows or minimum instream flows.[5] Mitigation does not guarantee that an instream flow set in rule will always be met. When an instream flow rule is established, it is generally recognized that the instream flow will not be met at all times. The objective of establishing instream flows is to identify the flows that are protective of fish habitat, even if those flows occur infrequently. This is because the benefits of infrequent higher flows on fish populations are considered necessary for their protection.

Avoiding declining flows is an important part of protecting fish production into the future. A significant consideration in instream flow protection is recognition that fish production is lower in fish generations that experience low flows (Beecher, 1981. Beecher, et al. 2010. Frenette,et al., 1984. Mathews, and Olson, 1980. McKernan, et al., 1950. Neave, 1949. Nelson, 1984. Smoker, 1953, 1955. Zillges, 1977).

Impacts of permit-exempt withdrawals on instream flows

Effects of permit-exempt wells on instream flows at state-wide and tributary scales

Ecology estimates suggest that approximately 15 percent of the state's population, or about 1 million people, currently rely on water supplied from permit exempt wells. Culhane and Nazy (2015) investigated several aspects of permit-exempt domestic wells in Washington. Based on their report:

- Statewide about 2,500 new permit-exempt domestic wells were drilled each year during the period between January 1, 2008 and September 4, 2014.

- Relying most notably on Ecology's well construction data base and 2005 U.S. Geological Survey (USGS) consumptive water use estimates (Lane, 2009) , overall permit-exempt domestic well use, including lawn and garden watering, amounts to only about 1 percent of total consumptive water use during the 4-month summer irrigation season.

- Consumptive water use attributable to public water supply amounted to about 4.6 percent for that same time period.

[5] SB 5965 Section 2 (1)(b)

To better understand the degree to which exempt wells are concentrated within certain subbasins, additional analyses were performed using a Geographic Information System.[6] Based on this analysis it is estimated that during the period investigated, about 80 percent of the new permit-exempt wells were concentrated within about 20 percent of the state. The results of this analysis are depicted in Figure 2 below.

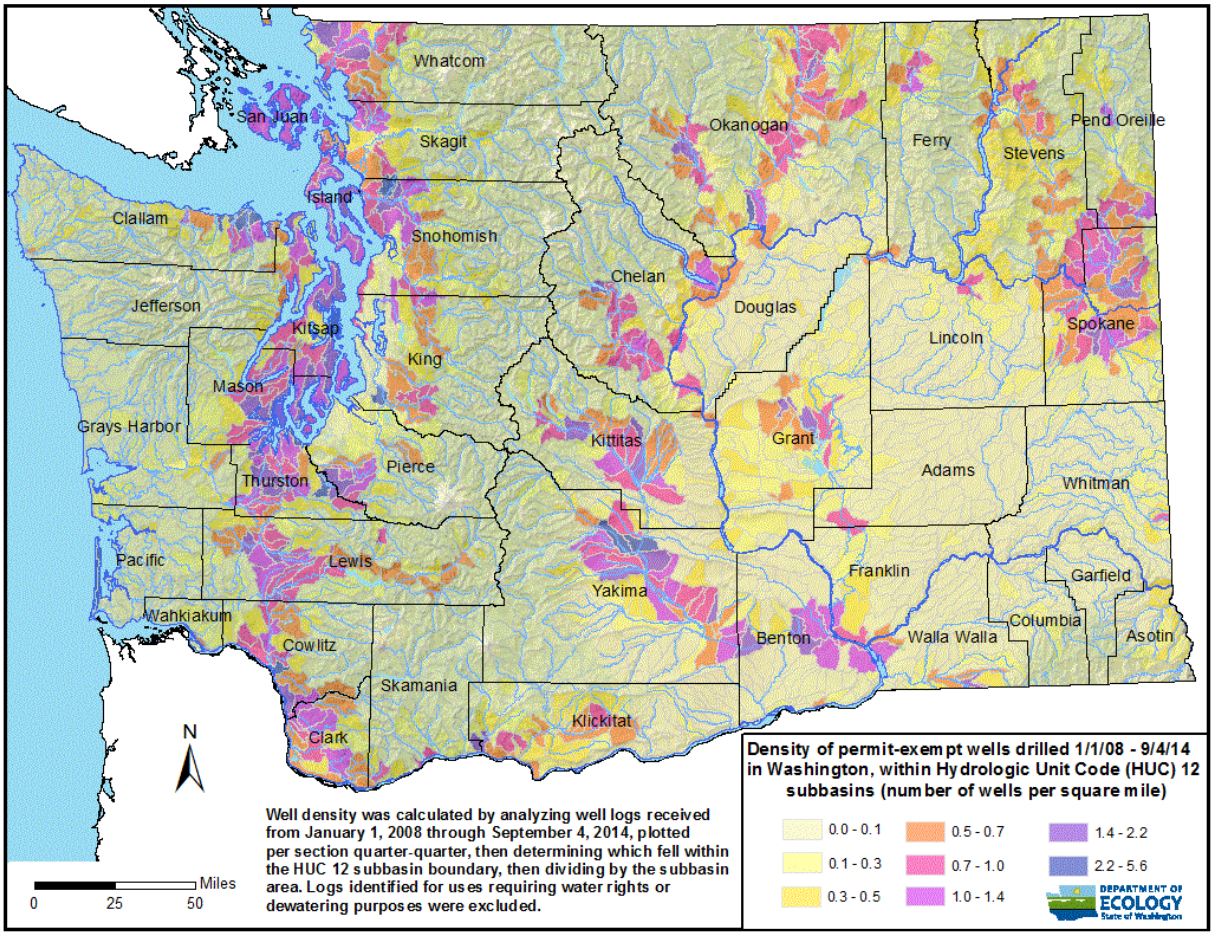

Figure 2. Density of permit-exempt domestic wells within USGS HUC 12 subbasins drilled between January 1, 2008 and September 4, 2014

Although well density is a useful metric for evaluating permit-exempt well use, the amount of outdoor water use from wells is more significant. Culhane and Nazy estimated the amount of outdoor water consumptive use, however, due to the source data used, their estimates were at best county-wide averages. Moreover, the effect of groundwater pumping on surface water

[6] During this analysis a point coverage of new exempt wells drilled January 1, 2008 through September 4, 2014 was overlain with polygons representing USGS hydrologic unit code (HUC) 12 subbasins. For subbasins located entirely within the state, the areas of the HUC 12 subbasins ranged from about 10 to 140 square miles, with an average of about 35 square miles and a standard deviation of about 14 square miles. The well count for each subbasin was divided by the subbasin area (or the portion of the area within Washington) to calculate the approximate well density.

involves many factors. To understand how exempt well consumptive water use translates into effects on streams at a local scale, other potential considerations include:

- **Well density/total withdrawal rates relative to stream size**
  This recognizes that on a local scale a large impact to a small stream is proportionally greater than that same impact to a large stream.

- **Geologic and hydrogeologic considerations**
  Many hydrogeologic factors affect how groundwater pumping affects streamflow.

- **Distribution of wells and well depths within the subbasin**
  The distance between a well and an affected stream, both horizontally and vertically, significantly affects the timing of well impacts. In addition, withdrawals at higher elevations generally impact longer stream reaches than lower elevation withdrawals.

- **Timing/seasonality of withdrawals with respect to streamflow**
  During summer months groundwater use is generally greatest and tributary streamflow is generally least.

- **Differences in indoor and outdoor consumptive water use**
  Indoor water use tends to be only about 10% consumptive (due to on-site septic systems), and outdoor water use tends to be about 80-90% consumptive (due to evapotranspiration).

- **Legal water availability**
  Legal water availability is very different than physical water availability, and is specific to individual surface and ground water sources.

- **Tangential hydrologic changes due to landscape changes**
  Construction associated with exempt well development can have significant effects on streamflow, due to increased stormwater runoff due to greater impervious surfaces.

A number of previous studies in Washington have evaluated some of these factors and produced varied results dependent on the circumstances in a particular watershed.

Spokane County Water Resources Investigation

In 2010, Spokane County Water Resources, in conjunction with Tetra Tech and Camp Dresser & McKee Inc., developed a county-wide water demand forecast model (Spokane County Water Resources, 2011 and 2013). This tool is based on water billing and production data, characteristics of self-supplied water users, demographic and socioeconomic data, agricultural and industrial data, and weather data. The model is capable of forecasting demand for numerous water use sectors, at various spatial scales and time horizons.

One important finding of Spokane County's investigation was that while the self-supplied residential sector represents only about 7 to 8 percent of total water demand, the impacts can be significant at the subbasin level. This is due to several streams within Spokane County having summer low flows near 1 cubic feet per second (cfs). For example, in the California – Lower Rock Creek subbasin, the forecasted increase in summer withdrawal was between 57 and 255 percent of stream flow.

Dungeness Watershed

To evaluate the effects of groundwater withdrawals on particular streams, some type of groundwater model is typically needed. If only one groundwater withdrawal is being analyzed, a simple analytical program may suffice. However, to analyze multiple withdrawals when complex hydrogeology is involved something like a three-dimensional, finite difference groundwater model is usually required. In the case of the Dungeness Watershed in Clallam County, Ecology hired Pacific Groundwater Group (PGG) to construct a 7-layer, transient MODFLOW model that represents groundwater movement in unconsolidated hydrogeologic units within the watershed.

Using the Dungeness groundwater model, Ecology performed numerous, separate model runs, with theoretical wells placed in the three major aquifers at varying locations. The results were then plotted on maps to show zones where well pumping would be expected to impact the Dungeness River. The study found, as shown in the following figures, that wells even 7 or 8 miles away can produce small impacts on the Dungeness River. Results of predicted impacts to all the smaller streams within the basin were also calculated. For example, the impacts to McDonald Creek resulting from pumping in the shallow aquifer are shown below.

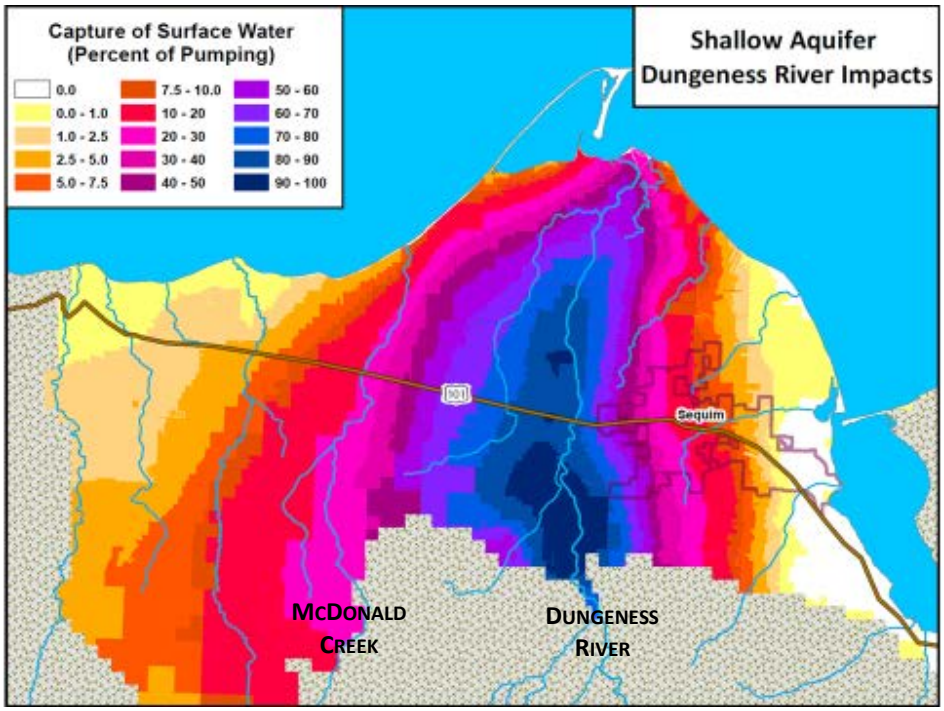

Figure 3. Potential impacts on the Dungeness River due to withdrawals from the Shallow Aquifer

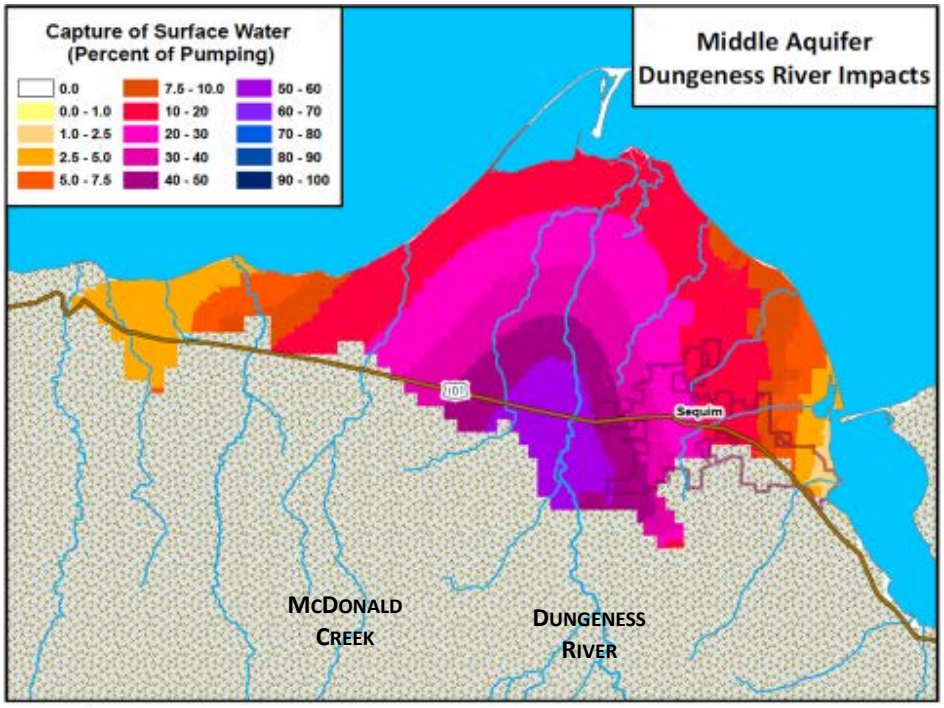

Figure 4. Potential impacts to the Dungeness River due to withdrawals from the Middle Aquifer

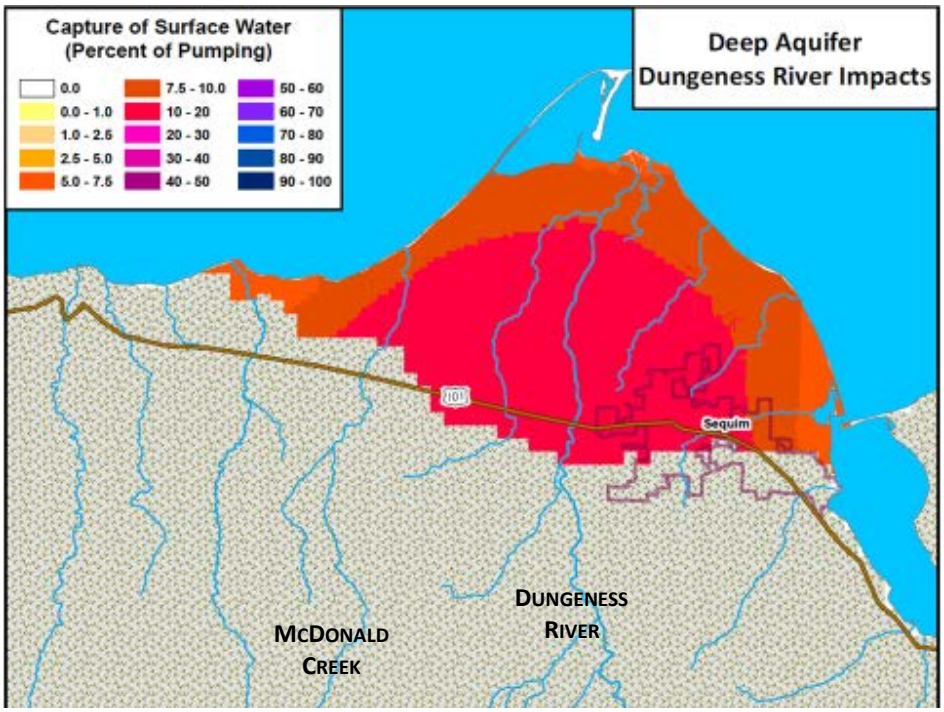

Figure 5. Potential impacts on the Dungeness River due to withdrawals from the Deep Aquifer

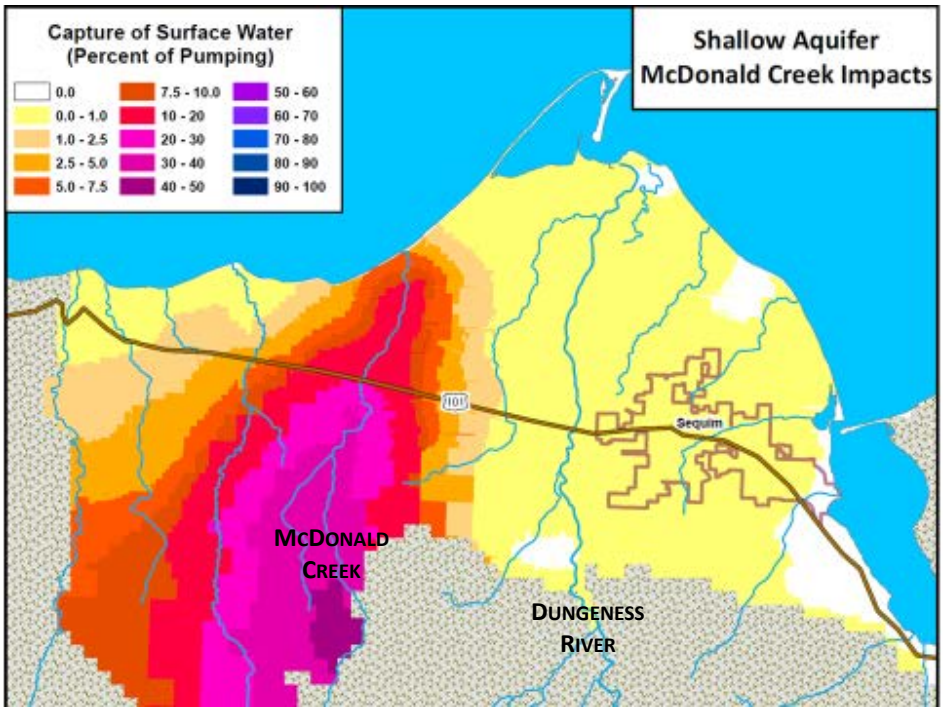

Figure 6. Potential impacts on McDonald Creek due to withdrawals from the Shallow Aquifer

Johns Creek and Goldsborough Creek Watersheds

Golder Associates (working for Ecology) and Keta Waters (working for the Squaxin Island Tribe) jointly developed a steady state, groundwater-flow model for the Johns Creek and Goldsborough Creek watersheds in Mason County. Golder Associates used this model to assess eight groundwater management scenarios to investigate the effects of future permit-exempt groundwater withdrawals on surface water in the Johns Creek watershed. The results indicate that instead of reducing stream flows, groundwater withdrawals will primarily decrease groundwater discharge to Oakland Bay. The percent change in streamflow modeled within reaches of Johns Creek ranged from a gain of 0.09 percent to a loss of 0.15 percent, with the slight increases of stream flows in the upper watershed due to the redistribution of water from septic return flows.

Landscape development effects related to exempt well development[7]

Permit-exempt well use, especially for domestic use, is always connected to a development project: construction of one or more houses, together with driveways, access roads, accessory

[7] This section presents information contained in the Stormwater Management Manuals for Eastern Washington (2004) and Western Washington (2012), published by Department of Ecology, Water Quality Program.

buildings, etc. In addition to the impact on instream flows that might be caused by the withdrawal and use of groundwater this landscape alteration also impacts instream flows.

Regardless of the hydrologic and geologic setting, streams are impacted by development of their watersheds. As development occurs, land is cleared and impervious surfaces such as roads, parking lots, rooftops, and sidewalks are added. Roads are cut through slopes and low spots are filled. Natural soil structure is lost due to grading and compaction during construction. Drainage patterns are irrevocably altered. Maintained landscapes that have much higher runoff characteristics often replace the natural vegetation. The accumulation of these changes results in changes in the natural hydrology, including:

- Increasing the peak volumetric flow rates of runoff,
- Increasing the total volume of runoff,
- Decreasing the time it takes for runoff to reach a natural receiving water,
- Increasing stream velocities,
- Reducing groundwater recharge,
- Increasing the frequency and duration of high stream flows,
- Increasing inundation of wetlands during and after wet weather, and
- Reducing stream flows and wetland water levels during the dry season.

Figure 1.1 from the Stormwater Management Manual for Western Washington 2012, illustrates some of these hydrologic changes (shown here in Figure 7). As a consequence of these changes in hydrology, stream channels may experience both increased flooding and reduced base flows. Natural riffles, pools, gravel bars, and other areas may be altered or destroyed. Increased channel erosion, loss of hydraulic complexity, degradation of habitat, and changes in the composition of species present in receiving waters may follow.

As peak flows and velocities are increased, so too is channel erosion – widening, deepening, or both. The consequence, particularly for widening, is that the same flow provides less habitat than before widening. Consequently, even if the same summer low flow occurred, the amount of habitat would be reduced. And with less recharge it's even worse.

There is a large and robust body of research into the effects of land development on streams, much of it focused on streams in Puget Sound. The hydrologic and biological changes in streams resulting from removal of native vegetation, increases in impervious surfaces, and alteration of natural drainage patterns are well documented and significant (May et al 1996).[8]

[8] Water quality impacts from land development are also well documented, and significant, but are outside the scope of this report.

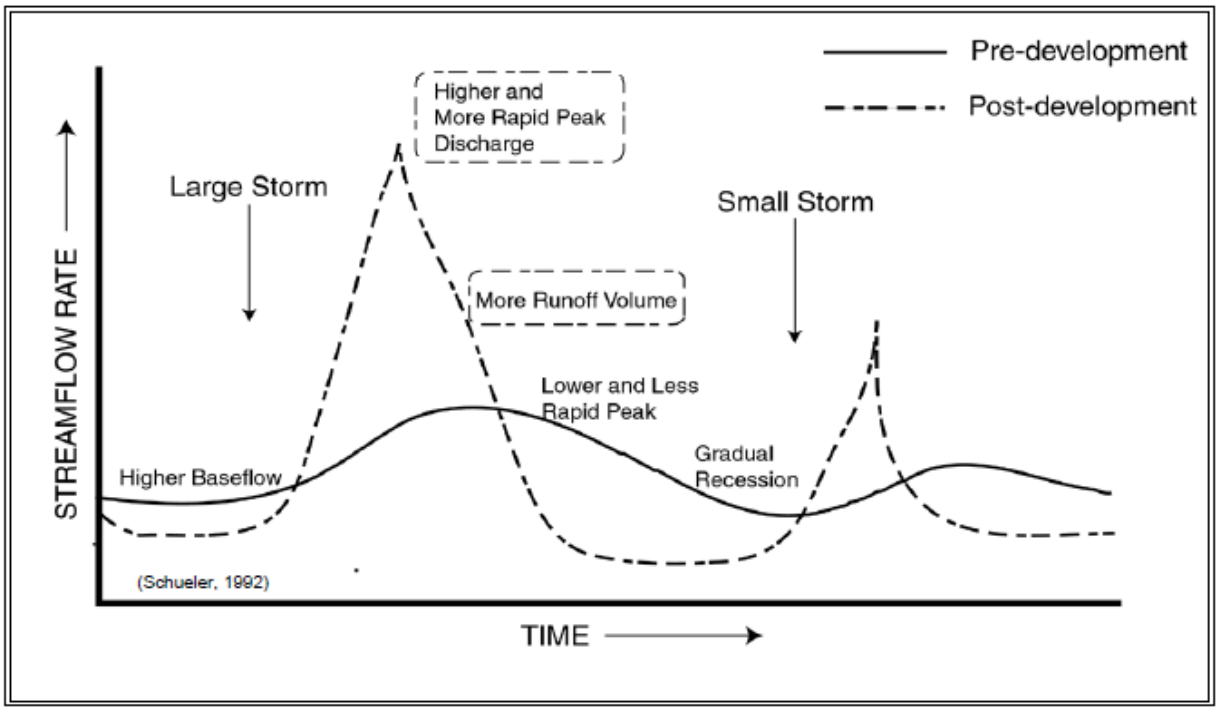

Figure 7. Changes in hydrology after development

Mitigation of Permit-Exempt Withdrawals

Why is mitigation needed for new permit-exempt withdrawals?

Mitigation of a new permit-exempt withdrawal of water is necessary when water is not legally available to supply new appropriations of water. There are three situations that can restrict the legal availability of groundwater that is in hydraulic continuity with surface water: closure of a source to new withdrawals; instream flows adopted by rule that must be protected; or impairment of existing out-of-stream water rights

Closures

Closures are based on findings that water is not available for new appropriations and that further uses from that source would be detrimental to the public welfare. Water may not be available because the source is fully, or over, appropriated and that further uses from that source would be detrimental to the public welfare. A closure is not an appropriation under the state water code. Closures are established through adoption of a rule, and may be included in rules that also

establish instream flows. Ecology's authority to close water bodies to new appropriations is discussed in detail in the *Postema* decision

A Surface Water Source Limitation (SWSL) is an administrative request by the Director of the Washington State Department of Fish and Wildlife (WDFW) under the authority of RCW 77.57.020 to condition or deny a water right application.[9] Many rules implement closures originally identified in SWSLs.

Closures in a rule specify application to surface water, groundwater, or both. However, a closure of surface water also affects groundwater in hydraulic continuity with the surface water body. The closure rule will also specify the timeframe for the closure, i.e. whether it is a year-round or a seasonal closure.

Instream flows

Instream flows adopted by rule constitute appropriations within the meaning of the state water code with priority dates as of the effective dates of their establishment (RCW 90.03.345). As a result, instream flows are legally entitled to protection from impairment by new junior water uses. New uses of water that are established after an instream flow is set must be interrupted when instream flow levels in the stream are not met. For most streams with adopted instream flows, water is generally available in the winter or spring when flows tend to exceed instream flow levels, and not available in the late summer or fall when stream flows are typically below instream flow levels.

Impairment of existing water rights

A right to use water is determined by its priority date relative to other rights from the same source. Under the prior appropriation doctrine, a person who established a water right first has a senior water right. This gives them the right to withdraw all their water before the next person in line, who holds a right "junior" to their senior right. In any river basin, the water use of junior water right holders can be interrupted if a water source is insufficient to meet all the water demands on it. When water supply is short, withdrawing water out of priority would impair the senior right.

All new appropriations, including new permit-exempt withdrawals, are vulnerable to being curtailed in favor of senior water rights unless the use is mitigated or some other compensation method acceptable to the senior water right user is negotiated. In the Yakima Basin, mitigation of permit-exempt well withdrawals is required to avoid impairment to senior water rights (not to mitigate for impairment of instream flows adopted in a water resource management rule).[10]

[9] WDFW also has a small streams policy (Policy 5204) stating that WDFW will discourage diversions from very small streams, with a mean annual flow of less than 5 cfs.

[10] For more information about mitigation in the Yakima Basin, see page 28.

What actions and associated impacts must be mitigated?

To authorize a building permit or subdivision, local government must have assurance that adequate water is both legally and physically available (RCW 19.27.097 and RCW 58.17.110). As most permitting activity is associated with new residences, mitigation of permit-exempt groundwater withdrawals typically focuses on addressing the need for domestic water use. The extent of mitigation needed depends on several factors:

- The type of the proposed use and whether it requires a dependable year-round water supply, such as for domestic use; or a seasonal water supply, such as for irrigation.

- The consumptive use impact of the groundwater withdrawal on the surface water body. This impact varies depending on the type of water use, the location, and the extent of hydraulic continuity.

- The limitation on the surface water body, such as, a seasonal or year-round closure, instream flow levels that are typically met during the winter months but not during the dry season, or senior water rights that have been curtailed in the past.

In river basins where a new appropriation of water is not legally available to support a proposed permit-exempt withdrawal of groundwater what must be mitigated is the impact of the proposed use on surface waters that results in a detrimental impact on senior water rights, including adopted instream flows.

How is mitigation effectiveness determined?

To evaluate mitigation proposals, it is necessary to have enough information about the intended water use, the proposed mitigation, and any assurances needed to ensure the effectiveness of the proposed mitigation. When evaluating a water right permit application, an applicant may submit a mitigation plan for Ecology review as part of the water right permitting process. A written mitigation plan is not always required for mitigation of permit-exempt withdrawals, however, the information that must be considered to determine effectiveness is essentially the same.

A mitigation plan describes a structured approach for implementing, monitoring, and maintaining the mitigation for as long as the water is withdrawn. A mitigation plan may address impacts for an individual withdrawal or for multiple withdrawals in a subbasin. Mitigation plans may be developed by project applicants or any other person or entity that has interest and expertise in water resource management.

The necessary elements of a mitigation plan are established in some water resource management rules. Ecology's policy on the review of mitigation plans for water right permits (WR Pol-2015) also includes a list of information needed in a mitigation plan. A typical mitigation plan should include:

- Identification of the source of supply for the proposed use and the proposed mitigation water, if applicable.

- Analysis of the consumptive quantity of water that will be depleted from the source.

- Identification of water rights, including instream flows, which will be affected by the proposed withdrawal.

- Evaluation of the reliability of the mitigation based on a detailed hydrological analysis, analytical model (including habitat assessment), or numerical model.

- Measuring and monitoring plan to ensure compliance, including a quality assurance/quality control plan.

- Financial and other assurance the mitigation will remain in place for the full duration of the new water use (often in perpetuity).

- Contingency measures or an adaptive management plan that will be followed if the mitigation is determined to be inadequate after implementation.

Developing mitigation for permit-exempt withdrawals should include consultation with Tribes and Washington State Department of Fish and Wildlife (WDFW). Other entities with technical expertise and local knowledge may also need to take part in developing proposed mitigation such as: local government, public utilities, agricultural water users, environmental interests, the local business community, and salmon recovery lead entities.

Mitigation techniques that may be available to mitigate the impacts of permit-exempt withdrawals[11]

The CEQ definition of mitigation is used as a framework for organizing and discussing various mitigation approaches:

Avoiding impact

In some situations it is possible to avoid drilling a well for new domestic water use by relying on alternative water supply options. These include: rainwater collection, hauling water (or a combination of rainwater and hauled water), and extending public water supply infrastructure (provided the water supplier has the capacity to provide additional connections). Ecology views these as alternative water supply options rather than mitigation, but they do avoid the impact of a permit-exempt withdrawal.

[11] SB 5965 Section 2 (1)(f)

There are many considerations that affect the feasibility of these options for a particular location including: cost, purity of potable water, precipitation patterns, or the distance water must be hauled. Ecology has found that property owners prefer wells over alternative water supply options, especially in areas where groundwater is physically available. From a public health perspective, groundwater is generally assumed to be the safest and most reliable source of potable water. Alternative water supply options are discussed in more detail in Section 1-5 of this report: Skagit Basin water supply options

Minimizing impact

Ecology has allowed minimizing impacts as a means of mitigation in one situation. The Water Resources Management rule for the Methow River Basin, Chapter 173-548 WAC, was amended in 1991 to close certain streams and lakes to further consumptive appropriations. The closure provision applies to new water right permits and to permit-exempt groundwater withdrawals.

The rule allows approval of groundwater withdrawals if the withdrawal is determined not to be hydraulically connected with the closed surface waters. New permit-exempt wells are allowed if they are cased and sealed 10 feet into the underlying granite bedrock, avoiding withdrawal from the gravel aquifer that is in direct hydraulic continuity with the closed surface water bodies. Mitigation is provided by minimizing the impact of permit-exempt withdrawals.

More recent Supreme Court decisions in *Swinomish* and *Foster* have established restrictions that mean this option to minimize impacts may no longer be viable in the development of future rules.

Rectifying the impact by repairing, rehabilitating, or restoring degraded environment

More than a century of land development, logging, farming, hydropower production, and other activities has resulted in many significant impacts to rivers and streams in Washington State. In many places rivers have been channelized, impounded, or disconnected from their floodplains. Riparian vegetation has been eliminated or greatly reduced. In developed basins, clearing and construction of impervious surfaces have lowered base flows as a result of reduced groundwater recharge and increased surface water runoff. Land development has also degraded or destroyed instream habitat features such as riffles, pools, and gravel bars due to increased peak runoff rates. Ecology is increasingly looking to projects that rectify past impacts and provide benefits to instream resources as mitigation or supplemental mitigation for new uses.

In the Yakima Basin, a total of four water banks operating within Tillman Creek and the Teanaway River provide mitigation to offset impacts to senior water rights. However, there are no adopted instream flows in the Yakima basin. These mitigation banks rely on supplemental mitigation projects to improve the effectiveness of the mitigation offered by each of the water banks. In each case, the water right retired by the bank was insufficient to effectively offset all of the adverse flow related impacts to fish habitat that would be expected from development of

the new groundwater uses. Their answer was to supplement the consumptive use offset derived from retirement of a pre-1905 water right with other projects. One improved fish passage conditions at the mouth of Tillman Creek. The other was to participate in a floodplain restoration project that would improve base flow after the end of the mitigation season. These projects are profiled in Appendix B.

Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

If statutory authority were available to restrict the quantity of water authorized for permit-exempt withdrawals it would be possible to reduce impacts over time. For example, irrigation of ½ acre of non-commercial lawn or garden can use from 2,000 to 4,500 gallons per day in the month of July, depending on your location. Most of that water use is consumptive, meaning it does not return to the aquifer. Reducing outdoor water use, or limiting new uses to indoor domestic use could greatly reduce the impacts of new residential water use.

Compensating for the impact by replacing or providing substitute resources or environments.

Most mitigation techniques that have proven effective to avoid impairment to existing water rights involve replacement or substitute resources. This section first describes the concepts of mitigation as being “in-kind,” “in-place,” “in-time,” or “out-of-kind;” followed by examples. In-kind, in-time, and in-place mitigation.

"In-kind" mitigation or "water-for-water" mitigation refers to offsetting the adverse impacts of a new withdrawal with an equal quantity of suitable quality water. "In-place" mitigation refers to measures whose benefits occur at the same location as the adverse impacts of a proposal. "In-time" mitigation refers to measures whose benefits closely mimic the quantity and timing of the adverse impacts of a proposal on a water source.

Out-of-time or out-of-place mitigation
"Out-of-time" or "out-of-place" mitigation refers to offsetting the adverse impacts of a new withdrawal with water, and targeting the benefit of the offset during a critical time period, and/or to a critical stream reach which does not align with the impacts of the new use of water. This approach to mitigation can be acceptable if it provides an equal or greater benefit to the environment than would be achieved with in-time and in-place mitigation. It is useful for streams where a critical low-flow time period or a specific stream reach have been identified as limiting to fish populations. Under the recent Supreme Court decision in *Foster* this may no longer be a viable mitigation option.

Out-of-kind mitigation
"Out-of-kind mitigation" refers to mitigating for a new water use by providing improvements that work with water to offset impacts, rather than physically replacing the water lost through the

new proposed use. SB 5965 defined out-of-kind mitigation as "techniques that seek to manage broader hydrologic impacts that may be associated with rural development rather than focusing on regulating the consumptive impact of new groundwater withdrawals. Out-of-kind mitigation techniques may include, but are not limited to, land development practices, habitat restoration, and best management practices." Under the recent Supreme Court decision in *Foster* this may no longer be a viable mitigation option.

Aquatic habitat mitigation is the only type of out-of-kind mitigation that has been considered as mitigation for permit-exempt well withdrawals. Any such mitigation is dependent on water and is only effective with water present.

To mitigate impacts of groundwater withdrawals, in some circumstances, it is possible to improve or prevent diminishment of the habitat index that is the basis for determining instream flow levels by constructing aquatic habitat for fish. Aquatic habitat, if quantified to incorporate habitat quality, is the standard used for most fish-focused instream flow methods.
Instream flows established in rules are based on the relationship between fish habitat and flow. Most fish-based instream flow methods use an index of habitat that relates distribution and amount of stream depth and velocity to channel form and stream bed material (gravel, boulder, bedrock, sand, pieces of wood, etc.).

The habitat index is a quantity that varies in response to how the distribution of depths and velocities changes with respect to channel form and stream bed material. The same habitat index may be attained in more than one way: a given flow, a different flow if the channel is modified in certain ways, or, since the index is assessed over a length of stream channel, if the channel length were changed the index could also change. Thus alternative means of achieving a target habitat index might be another means of mitigation.

Examples of out-of kind aquatic habitat mitigation that could potentially improve the habitat index include:

- In-stream habitat restoration
- Riparian corridor restoration
- Reconnecting historic floodplain
- Watershed protection

Out-of-kind aquatic habitat mitigation has some benefits:

- In the right circumstances, it is possible to provide greater benefit to instream resources than strictly in-kind mitigation could provide.
- It can allow some opportunities for new water uses in places where In-kind mitigation is not possible. (For example, where there are no senior water rights drawing from the source that would be affected by the new use.)

This approach to providing mitigation for instream flow impacts also has limitations:

- No mitigation measure provides value to fish habitat in a dry stream channel. Any out-of-kind mitigation would have to be accompanied by some level of flow protection. There must be a pre-determined limit on the amount of consumptive water use impact to the stream that will be "offset" by the out-of-kind mitigation. Water-for-water mitigation may need to be provided along with out-of-kind mitigation.

- Duration of mitigation is another important consideration. Because a permit-exempt water use of water is perpetual, the corresponding mitigation must likewise be perpetual. Stream channels frequently change and can be altered significantly during high flows. In-stream habitat restoration provides little benefit, or diminishes in value if hydrologic changes resulting from upland development are not managed. Any habitat-based mitigation measure may require on-going maintenance or adaption to continue to provide habitat value. Thus structural (non-water) mitigation measures require assurance that long-term maintenance and protection can be provided to ensure continued habitat value throughout the life of the withdrawal.

The following are examples of compensatory mitigation techniques that can be used to apply "in-kind," "in-place," "in-time," and "out-of-kind" mitigation:

Water for water mitigation

The most direct mitigation is water for water, from the same source, and for the same time frame as the proposed use (often in perpetuity). Such water-for-water mitigation is water budget neutral: the same amount of water remains in the stream and there is no impairment of the instream flow. However, it is seldom the case that a source of water available for mitigation precisely matches the timing or location of the impacts of the proposed new use of water.

There are a number of ways that water for in-kind mitigation can be provided:

- Placing senior water rights in the State Trust Water Program

- Permanent split-season lease agreements

- Shallow aquifer recharge (see below for more information)

- Storage for release during low flow

To mitigate for impacts to instream flows the source of water for mitigation must be a water right that is senior to the instream flow (the effective date of the rule), or water that is available when stream flows are higher than the adopted instream flow levels (i.e. water that is available when instream flows are met). If the estimated volume, timing, or location of the adverse impact is uncertain, water-for-water mitigation that replaces more than the estimated impact may be necessary.

Shallow Aquifer Recharge (SAR)

Shallow aquifer recharge (SAR) projects are a potentially promising way to provide mitigation. They focus on increasing surface infiltration and groundwater storage, and the discharge of water from the shallow aquifer back to the stream during low flow periods.

In shallow aquifer recharge (SAR), surface water is diverted when it is available to recharge groundwater with the intent of increasing stream flow at a later time. SAR can also be accomplished using reclaimed wastewater from municipal wastewater treatment facilities. The recharge method varies, and may involve spreading the water on land, transmitting through existing leaky conveyances like unused earthen irrigation districts, or can take the form of new wetland creation, or historic wetland restoration/enhancement.

SAR projects generally involve:

- Hydrogeologic investigation to identify suitable project sites for flow enhancement in a given stream and at a given time;
- Project design and engineering;
- Contracting for use of facilities, easements, and/or lands;
- Determining a source of water for infiltration which may require establishment of water rights;
- Financing for water rights purchase and project implementation; and
- Construction/execution of recharge project, operation management, and ongoing monitoring.

SAR projects can be effective for addressing seasonal low flow problems common to stream systems that have experienced significant alteration in land cover due to urbanization, flood plain constriction, or forest practices.

Reclaimed water or return flows

Reclaimed water or return flows (wastewater or storm water) can provide mitigation when used to augment streamflow. The effectiveness of this type of mitigation depends on the artificial maintenance of stream flows and assurances that the water be of appropriate quality for augmentation purposes. Therefore, it is allowed only where the water budget is well-defined, the risk of failure is very low, and there are sufficient control measures to ensure compliance for as long as the new water is withdrawn. Reclaimed wastewater or stormwater releases can be considered where properly permitted and where control measures are in place to protect water quality. Water right Reports of Examination, permits, and certificates should contain provisions to ensure water withdrawals stop whenever mitigation flows are unavailable. The same

assurances would be necessary to authorize this type of mitigation for permit-exempt withdrawals.

Pumped flow augmentation

Pumped flow augmentation, which involves pumping an aquifer to augment stream flow, is least preferred as mitigation. First, because pumping the augmentation water itself typically also reduces streamflow, it is more difficult to achieve a true gain. Second, as this type of mitigation depends on a very artificial means of stream flow maintenance, and always includes long-term maintenance and operation requirements, there are significant risks that this augmentation will not occur for as long as water is withdrawn or diverted.

Since pumped flow augmentation must not threaten the sustainable yield of the aquifer or impair other water rights it is more acceptable as a seasonal, rather than continuous, form of mitigation. Pumped flow augmentation can be allowed only where the water budget is well defined, the risk of failure is very low, and there are sufficient control measures to ensure compliance for as long as water is withdrawn or diverted.

Water banking

Water banks are a mechanism to facilitate the legal transfer and market exchange of surface water, groundwater, and water storage rights that makes water available for new uses. The common goal of a water bank is to move water to where it is needed most.

Many banks pool water supplies from willing sellers and make them available as mitigation credits to willing buyers. This type of mitigation has been successfully used to offset the impacts of permit-exempt well use on instream flows. Water banks make it possible for new permit-exempt well users to purchase small amounts of water that would not otherwise be marketed by senior water right holders interested in selling a large amount of water at one time.

The biggest drawback with mitigation banks is that they can provide mitigation only for new uses located such that they will impact a stream reach that benefits from the water rights that are banked.

Authority to use water banking to mitigate for new water uses is found in the trust water rights statute, Chapter 90.42 RCW. The water banking provisions of RCW 90.42.100 through .103, enables water rights that are senior to the instream flows to be placed into trust, then new water users may purchase portions of the senior water rights.

Mitigation banks can also engage in a range of mitigation activities, such as SAR and aquatic habitat restoration, as supplemental mitigation to ensure impacts resulting from the Bank's customers are offset. However, all mitigation options will need to be evaluated in the wake of the *Foster* decision to determine if they are viable.

Watershed approaches to mitigation

Watershed approaches are another potential strategy for mitigating the impacts of permit-exempt well withdrawals. A comprehensive watershed strategy could integrate a suite of actions potentially including in-kind mitigation, aquatic habitat mitigation, stormwater management, and land development practices.

A watershed mitigation strategy allows an opportunity to assess and prioritize actions that will provide the greatest benefits and successfully mitigate impacts in the watershed or subbasin being addressed. Diverse natural conditions, historic development, and patterns of water use require unique solutions for each basin.

To develop a watershed strategy, analysis is needed on the scale of future impacts, instream resource protection and restoration priorities, mitigation options, and limits on the amount of new consumptive water use allowable if supplemental out-of-kind mitigation is considered. Developing the strategy should involve state, local, and federal water resource managers, water users, Tribes, and other stakeholders, with agreement reached before proceeding. The watershed strategy must also identify an entity that will assume responsibility for the mitigation program's effectiveness and long term success. However, all mitigation options will need to be evaluated in the wake of the *Foster* Supreme Court decision to determine if they are viable.

Watershed approaches require significant investments. However a successful approach provides opportunities to mitigate for widely dispersed impacts.

Watershed approaches could encompass stormwater management best management practices such as Low Impact Development (LID). These practices could provide mitigation by reducing the hydrologic changes to streams resulting from land development (see the discussion of landscape development impacts related to exempt well development in section 1-6, below). However, these practices are not generally considered as mitigation for new permit-exempt withdrawals.

There is a Pollution Control Hearings Board (PCHB) summary judgment order considering whether a water right could be issued based on the infiltration of runoff from human-made impervious surfaces installed by the water user. The PCHB found the answer was no. "Absent the impermeable surfaces, the water would naturally recharge the system and benefit the base flows of streams. No credit is merited nor authorized under the Water Code for returning to nature, what originally belonged to it. That water, similar to the water allegedly gained from deforestation, belongs to the public and is subject to the right of prior appropriators."

Even if stormwater best management practices are not allowable as mitigation,[12] reducing impacts to streams could help lessen the overall mitigation burden. Also, the summary judgment order in the Black Diamond PCHB case did not address restoration actions that reduce impacts

[12] PCHB summary judgment order on statewide threshold issues, 1/16/1996. Black Diamond Assoc., Northeast Sammamish Water & Sewer District, and St. Andrews One. King County Superior Court Nos. 97-2-01097-7KNT, 96-2-20613-0KNT, 97-2-17943-2KNT, 97-2-17946-1KNT, 97-2-17932-7KNT, 97-2-17309-4KNT, 97-2-17936-0KNT PCHB Nos. 96-90, 96-56, 96-57, 96-72 to 74, 96-54, 96-94, and 96-53.

from existing land development in a basin. It might be possible that restoration actions that benefit stream flows could be used as mitigation.

Aquatic habitat restoration could also be included as an out-of-kind component to a watershed mitigation strategy to address places in the watershed where in-kind flow enhancement is not available. To evaluate the technical merits of potential options, an independent technical review board with expertise in stream ecology, fish ecology, fish population dynamics, hydrology, and hydrogeology is another possibility. However, under the recent Supreme Court decision in *Foster* aquatic habitat restoration may no longer be a viable mitigation option.

A watershed approach to providing mitigation could have some benefits:

- A watershed approach to mitigation would result in solutions tailored to the needs of the basin and could provide flexibility to target areas where mitigation would be most valuable, as opposed to mitigating each exemption one by one.

- Combinations of mitigation strategies are often necessary to fully mitigate for new uses.

- New well uses are typically dispersed throughout a watershed making it necessary to match mitigation with impacts across a large area. In addition, small tributary stream systems can be more sensitive to the impacts of new well withdrawals but have limited senior water rights available as sources of mitigation.

- This could reduce the local government and Ecology workload associated with requests for technical advice and rule interpretation for individual homeowners.

- There is an economy of scale, making mitigation more practical for groups than individual small users.

A watershed approach to providing mitigation also has limitations or challenges that must be addressed:

- Identifying suitable mitigation projects is often challenging (land acquisition, prioritizing, coordination), requires collaboration among diverse partners and a funding mechanism, and can take a lot of time.

- Ecology has no authority to acquire and manage property, so must partner with a land conservation group or a state agency that can acquire and manage property (DNR or WDFW, for example).

- Managing watershed level mitigation requires a willing organization with the appropriate capacity to manage the resources to achieve the expected outcomes.

- The long term success of mitigation projects must be guaranteed.

The state has not yet developed clear benchmarks to determine success in this sort of approach.[13]

SB 5965 called for a survey of in-kind flow enhancement strategies other than regulation of permit-exempt groundwater withdrawals. Some stakeholders have suggested that it would be advantageous to protect instream flows from the impacts of permit exempt withdrawals through some form of watershed-wide activities that focused on protecting or improving stream flows and habitat values, rather than relying on direct regulation of permit-exempt withdrawals. The objective appears to be to provide adequate mitigation with less regulatory or administrative burden for property owners and local governments. Some ideas have been suggested but nothing specific has ever been advanced.

One suggestion was to "decouple" the mitigation of exempt wells from a one-to-one permit process. The proposal was never fully described but seemed to suggest eliminating such things as assuring mitigation of an individual site and water banks, and instead relying on "watershed level" mitigation to address the impacts of exempt withdrawals.

A similar concept was considered in the Dungeness watershed during rule development. Local stakeholders, concerned with the potential complexity and costs to individuals of the still-in-development Dungeness Water Exchange, suggested that a "bulk water" restoration of flows could more than offset the impacts of future permit-exempt well use and eliminate the need for individuals to purchase mitigation. In response to this and other local concerns, Ecology decided to "pause" the rule development process to allow local stakeholders time to explore alternative water management strategies for the Dungeness. Rule development was put on hold in late 2010.

In February 2011, an Agreement in Principle (AIP) listing water management goals was signed by Clallam County, the Sequim-Dungeness Water Users Association, and Ecology. The Jamestown S'Klallam Tribe conveyed their support via a letter from Tribal Chairman Ron Allen. To work on goals listed in the AIP, the Local Leaders Water Management Work Group (LLWG) formed and met regularly through 2011. In addition to AIP signers, the City of Sequim, Clallam County PUD, and the Clallam Conservation District, as well as some members of the public took part in the discussions. The LLWG issued a final report in March of 2012 that accepted the premise that all new consumptive uses of water are obligated to mitigate that use. The LLWG also supported the Dungeness Water Exchange as the mechanism for new users to acquire groundwater mitigation credits. The report did not discuss what happened to the "bulk water" proposal; evidently it did not prove to be a viable option.

[13] SB 5965 Section 2 (1)(e)

Mitigation of permit-exempt withdrawals 2005 – 2015

SB 5965 called for:

> *A description of mitigation techniques the department of ecology has employed in the last ten years to mitigate the impacts of permit-exempt groundwater withdrawals on base flows and minimum instream flows, including the location, cost, and legal authority for each type of mitigation technique.*[14]

This section describes the mitigation programs for permit exempt withdrawals adopted through rules for the Walla Walla, Yakima, and Dungeness watersheds and for the Spokane River.

Walla Walla – Chapter 173-532 WAC - Water Resources Program for the Walla Walla River Basin, WRIA 32

The Walla Walla Basin poses unique water management challenges. The basin has limited water resources; it has been over-appropriated since the early 1900s (that is, more water has been distributed on paper, as water rights, than actually exists in the streams). As early as the 1880s, parts of the Walla Walla River were seasonally dried up, seriously impacting salmon and other fish. Water withdrawals intensify the natural low flow conditions that occur in the late summer and early fall.

Through cooperation and partnership among stakeholders over the past two decades, the Walla Walla Basin has demonstrated a collective commitment to enhance flows and improve water management practices for the benefit of fish, farms, and local communities. The Walla Walla Watershed Management Partnership and Ecology share governance of local water resources.

In 2007 Ecology amended the instream flow rule for the Walla Walla Basin. The amended rule requires new uses from the shallow aquifer and on land zoned for parcels that are 10 acres or less to mitigate for all outdoor water use. Mitigation is required for the period between May 1 and November 30. Metering of the new use is also required. The mitigation requirement became effective on May 1, 2008.

Individuals can opt to find their own mitigation or purchase mitigation from the program administered by the Walla Walla Watershed Management Partnership. The Partnership purchases water rights, stores them in the Water Bank, and divides them into Exempt Well Mitigation Credits for sale to prospective water users. State funding provided the seed money to purchase the initial water rights for the Water Bank. Community outreach to inform prospective home builders that mitigation is required is an important part of the program.

New home builders requesting mitigation water must pay a one-time fee of approximately $2,000 to the Walla Walla Watershed Management Partnership. Ecology then issues a legal document certifying that the home builder has fulfilled the mitigation requirement. Mitigation certificates are issued for .55 acre feet/year per residence. This amount provides about 1,000

[14] SB 5965 Section 2(1)(c).

gallons per day through the irrigation season, enough to irrigate about 1/12 acre (3,600 square feet).

A total of four homeowners have purchased outdoor use mitigation certificates from the Walla Walla Water Bank. The need for mitigation in this area is small because only a small portion of rural areas in the watershed are zoned "high density" (parcels 10 acres or smaller). Most rural areas are zoned for 20 or 40 acre lots. Also, much of this area was previously in irrigated agriculture. When residential lots are created, the irrigation water right carries along with the property.

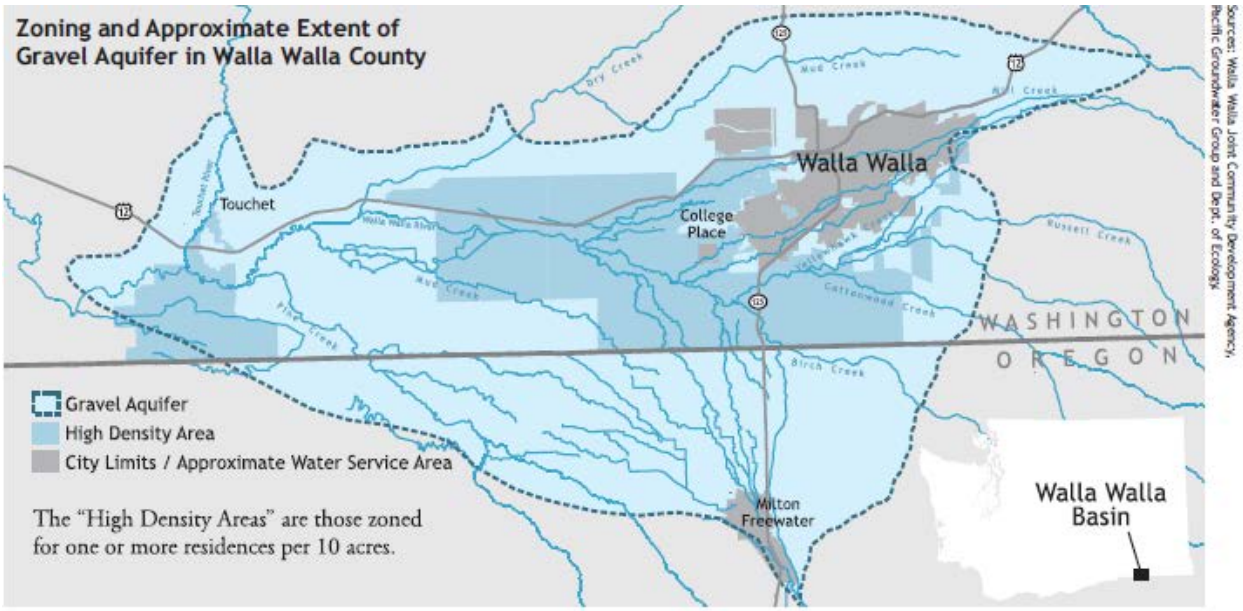

Figure 8. Zoning and Approximate Extent of the Gravel Aquifer in Walla Walla County

Yakima Basin – WRIAs 37, 38 and 39

The Yakima basin has the most intensive use of water in the state of Washington. The basin consists of three Water Resource Inventory Areas, the Lower Yakima (WRIA 37), the Naches (WRIA 38), and the Upper Yakima (WRIA 39). Much of the naturally available summer flow in the Yakima basin was spoken for more than a century ago. Increased demands from population growth, declining groundwater levels, endangered fish species, and impacts from climate change are adding to the challenge of finding new water supplies in the Yakima Basin, especially during the summer months.

Surface waters in the Yakima Basin are under adjudication and are not available for new uses. The Yakima adjudication has affirmed very early priority date water rights held by the Yakama Nation for both on-reservation irrigation uses and on- and off-reservation instream flows. Several thousand state-issued water rights have also been confirmed. Water rights associated with a U.S. Bureau of Reclamation water project serving irrigation districts have a priority date of May 10, 1905. Junior surface water rights in the basin, with priority dates after May 10, 1905, may be

shut off during a drought. Surface waters in the Yakima Basin are managed under the adjudication to protect senior water rights, but there are not adopted instream flows in the Yakima Basin.

Reports issued by the USGS conclude that existing groundwater pumping and consumption, most of it under rights established after 1905, reduces flows in the Yakima River and tributaries by up to 200 cubic feet per second at the mouth of the Yakima River.[15] These findings suggest that further groundwater development should be approached cautiously and perhaps be subject to mitigation to avoid the risk of regulation to protect senior surface water rights.

In the upper Yakima Basin, the Upper Kittitas Groundwater Rule, Chapter 173-539A WAC, requires mitigation for new permit-exempt groundwater uses. To ensure compliance with the rule and provide dependable water supplies to rural domestic water users, water exchanges have been established in the Upper Kittitas, Lower Kittitas, Central Yakima, and Lower Yakima basins. A total of nine water banks serving different portions of the basins are selling mitigation credits to new and existing permit-exempt well users.

Table 1. Water Banks in the Yakima Basin

Water Bank	Basins Served	Tributaries Served
Burchak Tillman Creek	Mainstem	Tillman Creek
Williams and Amerivest (Run by Kittitas County)	Mainstem	Manastash Creek
Reecer Creek Golf Course	Mainstem	
JP Roan	Mainstem	Swauk and First creeks
Swiftwater Ranch	Mainstem	Teanaway River
Masterson Ranch	Mainstem	Teanaway River
Suncadia	Mainstem	
Roth-Clennon (Assigned to Kittitas County)	Mainstem	
Yakima Mitigation Services	Mainstem	

The mitigation provided by these water banks is almost exclusively through the purchase and transfer into the State Water Trust of senior (pre 1905) water rights, providing in-kind water budget neutral mitigation. The cost of purchasing mitigation is set by the entity owning and managing the water bank. The range of costs for domestic (in-house and some irrigation) mitigation is from $4,000 to $14,000.[16]

[15] Ely, D.M., Bachmann, M.P., and Vaccaro, J.J., 2011, Numerical simulation of groundwater flow for the Yakima River basin aquifer system, Washington: U.S. Geological Survey Scientific Investigations Report 2011-5155, 90 p. Gendaszek, A.S., Ely, D.M., Hinkle, S.R., Kahle, S.C., and Welch, W.B., 2014, Hydrogeologic framework and groundwater/surface-water interactions of the upper Yakima River Basin, Kittitas County, central Washington: U.S. Geological Survey Scientific Investigations Report 2014–5119, 66 p., http://dx.doi.org/10.3133/sir20145119.
[16] Robert Barwin, Ecology Water Resources Program, Central Regional Office, personal communication

Two mitigation projects are currently underway in the Yakima Basin that supplement water banks operating in the Teanaway River and in Tillman Creek. In each case, the supplemental project is designed to address a critical element of the mitigation program that acquisition of a water right alone could not accomplish. These projects rely on instream habitat enhancement or restoration to provide supplemental mitigation.

In the Teanaway River basin, a project on Indian Creek will reconnect the historic floodplain and the creek by placement of large woody debris with the objective of improving storage capacity within the floodway. This project includes extensive monitoring to evaluate effects on stream flow and groundwater levels.

The second project, in the Tillman Creek subbasin in the Upper Yakima Valley, involves reconnecting a small unnamed tributary to the main channel of Tillman Creek. The small unnamed tributary was cut off from Tillman Creek by construction of the railroad long ago. Reconnecting the small tributary increased flows in Tillman Creek, aiding fish passage.

As these examples demonstrate, projects beyond water-for-water mitigation can have a positive impact on stream flows, and have the potential to reduce the amount of time instream flows are not met. (More information on both supplemental mitigation projects is in Appendix 1.)

Dungeness – Chapter 173-518 WAC - Water Resources Program for the Dungeness Portion of the Elwha-Dungeness Water Resource Inventory Area (WRIA) 18

Located in the rain shadow of the Olympic Peninsula, the Dungeness watershed is the only coastal watershed in Washington where an irrigation distribution system is necessary for agricultural crops. The irrigation system, the river and many small streams interact with the groundwater system that supplies domestic water for residences and the City of Sequim. The Dungeness River is fully appropriated, and water rights for the Dungeness area irrigators were adjudicated in 1924.

The Dungeness water management rule (Chapter 173-518 WAC) took effect January 2, 2013. The rule requires mitigation of all new uses of water, including permit-exempt withdrawals. Individuals can opt to find their own mitigation or purchase mitigation from the Dungeness Water Exchange.

The Dungeness Water Exchange was created through collaboration between Ecology, Clallam County, the Dungeness Water Users Association, the Jamestown S'Klallam Tribe, City of Sequim, Clallam PUD No.1, Clallam Conservation District, Washington Department of Fish and Wildlife, and Washington Water Trust. The Dungeness Water Exchange is operated by Washington Water Trust (WWT), a third party, non-regulatory nonprofit, dedicated to improving and protecting stream flows and water quality throughout Washington State.

WWT purchased 175 acre feet per year of water rights from the Dungeness Water Users Association to hydrate the Exchange, using seed money provided by the State. The water rights acquired are from the Dungeness River mainstem. However, mitigation is also needed in the small streams throughout the watershed. The water right purchase included an agreement

between the Dungeness Water Users Association and WWT to work together to deliver water to aquifer recharge projects that will provide comprehensive mitigation across the Dungeness watershed to benefit the small streams.

The mitigation water purchased is divided into two portions:

- 45 acre feet and 0.76 cubic feet per second stays in the Dungeness River from August 15th to September 15th – to offset impacts to the Dungeness River mainstem.

- 130 acre feet and 2.2 cubic feet per second are available for shallow aquifer recharge projects between May 15th and July 15th –to offset impacts to small streams.

The mitigation framework for the Dungeness is unique. A groundwater model provides a high level of understanding of the groundwater – surface water interactions in this watershed. Each new withdrawal impacts the Dungeness River and the small streams in the watershed. Therefore the mitigation requirement for each parcel is distributed across the watershed.

Impacts to the Dungeness River downstream from the irrigators' diversions are fully mitigated in-kind by the water right purchased for the Exchange.

The impacts to the small streams in the watershed will be mitigated through shallow aquifer recharge (SAR) projects. It will take several years to locate, design, and construct these SAR projects so small reserves of water were developed for domestic use. New water users must purchase mitigation credits from the Exchange, and the impacts of each new use will be tracked and debited from the reserves (and equivalent maximum depletion amounts). As SAR projects are constructed, mitigation will replenish the reserves. If a reserve (and maximum depletion amount) for a specific stream becomes fully depleted, new uses of water are prohibited until mitigation is provided to replenish that reserve.

The Exchange offers three indoor and outdoor mitigation packages, described in the table below. Separate stockwater mitigation packages are also offered by the Exchange.

Table 2. Mitigation packages offered by the Walla Walla Water Exchange

Mitigation Package Descriptions				
Package Description	**Average Amount of Indoor Use** (Gallons/Day)	**Average Amount of Outdoor Use** (Gallons/Day)	**Amount of Irrigated Lawn Area** (Square Feet)	**Amount of Irrigated Lawn Area** (Acres)
Indoor Only Package (minimal incidental outdoor use only) $1,000	150* (average)	0	0	0
Indoor with Basic Out-door Package $2,000	150* (average)	89	2,500 sq. ft. (approx. 50 x 50 ft.)	.06 acres
Indoor with Extended Outdoor Package $3,000	150* (average)	200	5,625 sq. ft. (approx. 75 x 75 ft.)	.13 acres

*Note: The Exchange accounts for domestic mitigation using a standard average daily amount of 150 gallons (WAC 173-518-080 (b). This is the annual amount of water that the Exchange and the mitigation certificate purchaser agree upon as the basis for their transaction.

Currently outdoor use mitigation is not available for parcels located at a higher elevation than the diversions and irrigation distribution system from the Dungeness River. Ecology is working with local partners and resource co-managers to develop mitigation solutions for outdoor water use in the upper watershed.

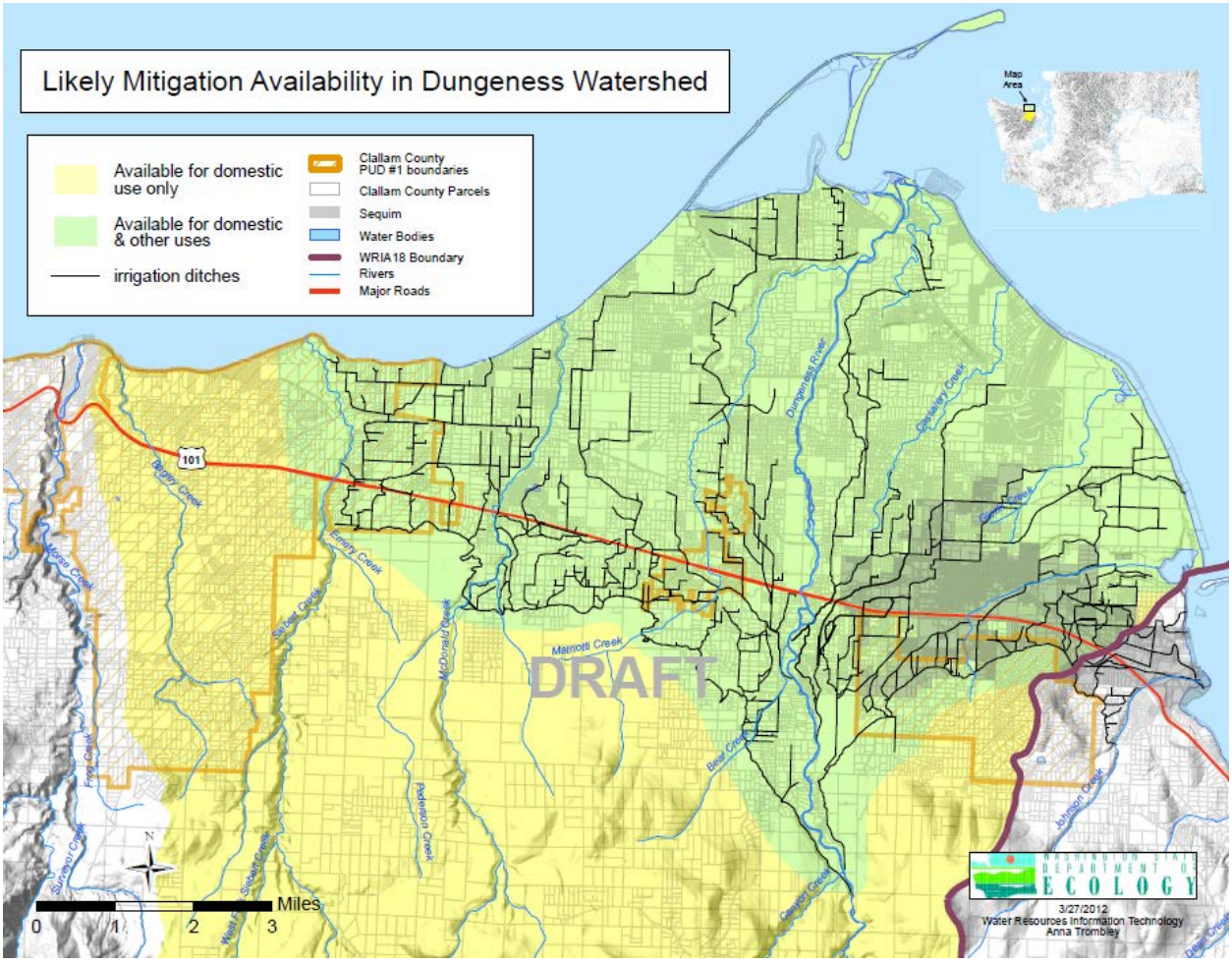

Figure 9. Likely mitigation availability in the Dungeness Watershed

Spokane River: Chapter 173-557 WAC, Water Resources Management Program (WRMP) for the Spokane River and Spokane Valley Rathdrum Prairie (SVRP) Aquifer

On January 27, 2015 Ecology adopted an instream flow rule for the Spokane River and Spokane Valley Rathdrum Prairie (SVRP) Aquifer. The rule became effective February 27, 2015.

Within the area regulated under the rule, municipal water suppliers are the primary sources of water for new uses. If water is not available in a timely and reasonable manner from a municipal

water supplier, the consumptive use impacts to surface water from new permit-exempt groundwater withdrawals must be interrupted when stream flow is below the instream flows established in this rule, unless those impacts are mitigated.

For the few parcels that may not be able to obtain water from an existing provider in a reasonable and timely manner, Ecology has set up the SVRP Aquifer Bank to provide mitigation water. The mitigation water comes from a 153 acre foot senior water right acquired and placed in trust by Ecology, with help from Washington Water Trust.

Each project is limited to a maximum of one acre-foot of water within a given year, for the four uses allowed under the groundwater permit exemption:

- Single or group domestic uses not to exceed 5,000 gallons per day.
- Non-commercial irrigation of up to ½ acre of lawn and garden.
- Industrial uses not to exceed 5,000 gallons per day.
- Stockwater not to exceed 5,000 gallons per day.

No fee is currently required for mitigation water from the SVRP Aquifer Bank. However, the Certificate of Mitigation must be recorded with the County Auditor's Office, which requires a fee set by statute. The Certificate of Mitigation remains until the permit-exempt well use is discontinued or the well is abandoned. In such cases the mitigation credit will automatically revert back to the water bank. This mitigation water can then be reissued for future new permit-exempt uses.

Skagit basin water supply options

SB 5965 stated the report would include:

> *An evaluation of all mitigation options that may be available for permit-exempt groundwater withdrawals in the areas covered under the instream resources protection program for the lower and upper Skagit river basin, water resource inventory areas 3 and 4, and a discussion of the advantages and disadvantages of employing each type of mitigation technique in those areas*[17]

The Skagit River Instream Flow Rule (WAC 173-503) went into effect April 14, 2001. The rule established instream flows to protect flow levels in the Skagit River and its tributaries. The rule was amended in 2006 to establish 25 surface and groundwater "reservations," to allow future uninterruptible out-of-stream water uses.

[17] SB 5965 Section 2 (1)(g)

On October 3, 2013, the Washington Supreme Court ruled that Ecology exceeded its authority in setting aside reservations of water where water was previously set aside to support stream flows for fish in the Skagit River basin (*Swinomish* Indian Tribal Community v. Department of Ecology). Without water reservations, all water uses, including permit-exempt withdrawals, established after the 2001 rule took effect, could be curtailed when stream flows fall below the adopted instream flow levels. Prior to the *Swinomish* decision, approximately 475 homes and businesses had relied on the reservations for their water supplies.

To address current and future water resource needs in the Skagit basin, Ecology is working with local governments, Tribes, water utilities, and landowners to develop sustainable water supply solutions in the Skagit basin.

While water supply solutions for the whole basin are being developed, water supply proposals for several individual residences have been approved by Ecology. All approvals have included consultation with Skagit County and Tribal governments. The following water supply options are currently available to property owners in the Skagit Basin:

- Hook up to a public water supply where available in a timely and reasonable manner
- Rainwater collection and/or trucking water, with a cistern for storage
- Build in areas where the well will not be in hydraulic continuity with the Skagit River and not impact Skagit River flows (i.e. Padilla Bay area)
- Propose a mitigation plan for an individual site or group of sites (private mitigation plan)

Some home owners have chosen to tear down an existing house and rebuild. The water supply for the older home becomes available for the new home.

Skagit Water Exchange

Ecology has contracted with Washington Water Trust, a non-profit organization with experience in developing and administering water banks, to develop a Water Exchange for the Skagit basin. The Skagit Water Exchange is exploring all possible mitigation strategies to offset the impacts of new permit-exempt well withdrawals, including purchasing water rights and developing mitigation projects. As Ecology's Skagit Water Exchange implements mitigation strategies in different stream reaches, property owners will be able to purchase mitigation credits for new uses that would have otherwise impacted those specific stream reaches. However, there is no guarantee that a mitigation option will be found for every reach.

Alternative water supply (mitigation avoidance options) for the Skagit Basin

Cisterns: Rainwater collection and/or trucking water as alternative supply

Rainwater harvesting is a feasible domestic water supply alternative in the Skagit watershed. In 2015 Skagit County Public Health began approving rainwater harvesting for potable use.

At its most basic, a rainwater collection system consists of a roof, gutters, and related plumbing, piping, filtration, and treatment mechanisms for collecting and transporting water to and from the storage cistern, and a pump/distribution system for moving water throughout the building.

The single largest fixed cost is the cost of a storage tank. Capital cost estimates for rainwater harvesting systems range from $25,000 for an indoor only system, to over $260,000 for a system capable of irrigating up to 10,000 square feet. This suggests that rainwater harvesting is either not a cost-effective solution for outdoor watering or that a dual indoor/outdoor system would be needed (tank materials for potable use are more expensive than for irrigation use). (Ecosystem Economics, DRAFT Strategy Paper for the Skagit Water Exchange, July 2015). These estimates also assume complete reliance on rainwater for potable and irrigation purposes and therefore very large collection and storage capacity. A smaller cistern with water supply augmented by hauling water would reduce up-front costs. Cost estimates for a hybrid rainwater/hauled water system are not available.

The state Department of Health will not approve a new Group A public water system (15 or more connections) or Group B public water system (2-14 connections) with rainwater collection as permanent source of supply. However, local government may adopt regulations to allow individual homes to be permitted using rainwater as the building's water supply.

Hauling water

There are private companies that will deliver water. The primary fixed cost for a trucked in water system is the storage cistern. The largest recurring cost is water delivery with separate charges for the water and the delivery. Economic analysis estimates the cost per household of trucking water for a twenty- year period ranges from $50,000 for an indoor only system, to $115,000 for a system capable of irrigating up to 10,000 square feet (Ecosystem Economics, DRAFT Strategy Paper for the Skagit Water Exchange, July 2015). The state Department of Health will not approve a new a Group A or Group B public water system to use hauled water as a primary water supply source. However, local government may adopt regulations to allow individual homes to be permitted using hauled water as the building's water supply.

Advantages:

- Rainwater harvesting and/or hauling water are water supply options immediately available to property owners in the Skagit watershed.

- Depending on the scale of intended water use, the cost of these systems can be comparable to drilling and pumping from a well.

Disadvantages:

- Homeowners are unfamiliar with these systems so there is a learning curve, particularly with respect to ensuring safety of potable water.

- Banks are also unfamiliar with cistern-based water systems and some have expressed reluctance to loan money for these systems (John Rose, Ecology, personal communication.)

- Irrigation of a full ½ acre of non-commercial lawn or garden, as allowed with a permit-exempt well, is likely to be cost prohibitive with this alternative.

- DOH regulations limit use of hauled water.

Wells not in hydraulic continuity with the Skagit River

A number of residences have been approved where it was demonstrated that groundwater withdrawals were not in hydraulic continuity with the Skagit River or its tributaries. Typically these homes are located very low in the watershed and the groundwater in these areas is flowing directly to Puget Sound. Ecology is preparing a map showing the area where it is most likely withdrawals will not impact instream flows.

Proposed mitigation strategies for the Skagit Basin

Acquisition of senior water rights to provide in-kind mitigation.

On October 11, 2013, Ecology completed the purchase of three water rights from the Big Lake Water Association, a public water system near Mount Vernon. Ecology acquired approximately 15 acre-feet of water for mitigation purposes and 18.56 acre-feet of water for stream flow enhancement. This is an amount of water sufficient to mitigate for approximately 67 to 163 residences in the Nookachamps subbasin. The actual number of residences mitigated will depend on the number of homes located in the area that can benefit from the mitigation water, and the proportion of homes that request mitigation water for indoor use only versus the proportion that choose to include irrigation of a lawn or garden. (Ecosystem Economics, Skagit Demand Analysis, July 2015)

Ecology is developing a mitigation proposal for the Big Lake Water Rights, designating the area served by the mitigation and the process for obtaining mitigation credits. Ecology will seek public input on the proposal before finalizing the mitigation project.

Discussions are underway with public utilities that own senior water rights on the main stem of the Skagit River. Ecology is optimistic that sufficient water rights may be acquired to offset the impacts of permit-exempt withdrawals in hydraulic continuity with the mainstem of the Skagit River. Ecology is working on a hydrogeological analysis to determine how many parcels could benefit from this mitigation water. Preliminary analysis indicates more than 150 of the estimated 475 parcels that relied on the invalidated reservations in the 2006 Skagit rule amendments could be mitigated if mainstem mitigation is successfully acquired. (Ecosystem Economics, Skagit Demand Analysis, July 2015)

Advantages:

- Where this type of in-kind mitigation is available, it provides a direct offset for the consumptive use impacts of new permit exempt withdrawals.

- This approach has broad support from stakeholders in the area.

Disadvantages:

- This type of in-kind mitigation is limited to places where senior water rights exist and are available for purchase.

- These water rights must be drawing from the source water bodies that will be impacted by permit-exempt withdrawals needing mitigation.

- In the portion of the Skagit basin upstream from Sedro Woolley, few large year-round water rights exist, and those that do exist are not available for sale.

Shallow Aquifer Recharge (SAR)

SAR projects have been considered in the Skagit Basin. Such projects typically capture and retain water during periods of high, prolonged precipitation and release retained water during dry seasons to offset impacts from groundwater pumping. The primary factors determining feasibility are site-specific hydrology and geology, the availability of suitable land, the supply of water, and the presence of an entity that will operate the SAR facility in perpetuity.

To provide effective mitigation, SAR projects must result in benefits to the affected stream reach during the time when instream flows are not met and consumptive water use impacts are occurring. Soil characteristics and the distance between the recharge site and the target stream reach will influence the timing of water infiltrating to the stream. SAR projects require careful site-specific modeling and analysis to determine when and how much water released into the infiltration facility appears in the surface stream.

SAR projects must be sited on land with proper soil characteristics and an appropriate location in the basin to provide benefits to the stream reach that would be affected by new users. Suitable sites are a possibility in Lower Skagit subbasins. Subbasins located in the Upper Skagit

watershed are generally dominated by bedrock in their upper reaches, which limits the likelihood of suitable sites. In addition, the land must be available for lease or purchase so that it can remain committed to this use for as long as mitigation is required, typically in perpetuity.

Water availability is another constraint. Senior water rights are generally unavailable in tributary subbasins where mitigation is most needed. Depending on the specific surface water source, some SAR projects may be able to rely on high flow events or stormwater runoff to provide water for recharge. However, where high flows can provide water for recharge, the water will very likely only be available in limited amounts at very specific times of year. Availability will also vary from year to year depending on normal climate variation. Therefore, reliance on high flows will likely constrain both the timing and amount of water available for recharge and, as a result, limit its viability as mitigation.

Since SAR relies on an infiltration facility, a reliable entity for operation and maintenance is necessary. This entity, such as a local or tribal government, PUD or non-profit, must be committed to running the facility and have enough permanence to ensure mitigation in perpetuity.

In 2014 the Upper Skagit Tribe proposed a 0.1 cfs wetland recharge SAR project in the Fisher Creek sub-basin (Associated Earth Sciences 2014; Mentor Law Group 2014). The feasibility study indicated the project could be legally and technically feasible. After three public meetings, the proposal failed to gather community support and the project proponents decided not to pursue the project.

Further economic analysis of the Fisher Creek SAR project estimated the cost per homeowner would likely be higher than for other mitigation options. The analysis also noted that SAR might only be a reasonable investment in a small number of tributary subbasins that have a higher concentration of potential mitigation sites. (Ecosystem Economics, DRAFT Strategy Paper for the Skagit Water Exchange, July 2015)

Advantages:

- Analyses generally show that in some areas SAR projects are potentially feasible from a technical and legal standpoint.

- SAR projects could work in locations where state-issued water rights are not available.

Disadvantages:

- Employing SAR as mitigation will require detailed upfront hydrogeologic analysis and on-site testing to ensure mitigation is effective. This means SAR projects might require significant time and resources before they can be put to use as mitigation.

- Not all subbasins could benefit from SAR.

- It is unclear to what extent water and/or water rights are available as sources of water to fully supply the projects.

- Entities that could operate SAR facilities have not been identified.

- It is not certain these projects will be cost-competitive with other mitigation or alternative water supply options.

Out-of-kind mitigation

Ecology is open to considering out-of-kind mitigation in the Skagit basin. However a decision on whether to allow out-of-kind mitigation depends on the strength of a specific project. An out-of-kind mitigation project would need to demonstrate that instream habitat values would be sufficiently improved to offset consumptive use impacts, with assurance that the benefit would persist in perpetuity. Any such projects must provide a net benefit to the same fish subpopulations that would be impacted by the water use. The project must have broad support from WDFW, the Tribes, landowners, and other water management partners in the basin. At this time there are no specific out-of-kind mitigation proposals under consideration. Under the recent Supreme Court decision in *Foster* this may no longer be a viable mitigation option.

Advantages:
- Flexibility to mitigate for new uses where no other mitigation options are available.

- In the right circumstances it is possible to provide greater benefit to instream resources than strictly in-kind mitigation could provide.

Disadvantages:
- This option would likely result in further litigation and continuing uncertainty for property owners.

- Out-of-kind mitigation is a long term proposal.

- Projects will require detailed upfront analysis, identifying an entity to provide ongoing oversight to ensure the benefits of the mitigation are maintained in perpetuity, and review and approval by resource managers.

- Criteria would need to be established to determine the tradeoffs between habitat improvements and consumptive use impacts. Such criteria are often controversial.

Site-specific mitigation

Ecology has received two types of proposals for site-specific mitigation for new residential water use. Neither proposal could be approved for the reasons listed below. However, Ecology encourages public and private entities to submit proposals. Projects must be water budget

neutral to the Skagit River when instream flows are not met, and protect instream resources in tributaries. They would also have to provide appropriate provisions for monitoring to ensure the mitigation will remain effective for the duration of the new water use (in perpetuity).

Ecology has received two types of proposals for site-specific mitigation for new residential water use:

- The first proposal would rely on a permit-exempt well withdrawal, and pumping only during high-flow periods, when instream flows are met in the river. During high-flow periods pump excess water into a storage system. Cease pumping and rely on stored water during dry periods when instream flows are not met.

- The second proposal would rely on a permit-exempt well withdrawal year round, with on-site mitigation provided by rainfall collection. Rainfall would be collected into a non-potable storage system and discharged into surface water during low flow periods.

Ecology found these proposals could not be approved until the following challenges were resolved:

- Both proposals would require a detailed hydrogeologic analysis of site-specific conditions to determine either: the timing for when pumping is allowed or not allowed for the first proposal; or to determine when and how much water must be discharged to offset impacts.

- The interaction and impact of multiple site specific mitigation projects is not yet understood and must be addressed in the hydrogeologic analysis.

- If there are drought conditions and instream flows are not met for extended periods, a contingency water supply (e.g. hauled water) would be needed.

- Assurance of long-term compliance, in perpetuity, of such a mitigation strategy for a single household is needed.

Public Water Systems – proposed mitigation and alternative water supply

There are a number of public water systems in the Skagit basin that have water rights senior to the instream flows established in 2001. Ecology has commissioned two in-depth studies of existing public water systems in the Skagit basin to determine if they could help provide water solutions. These studies assess the status and availability of water rights owned by public water purveyors, and investigate possible water supply or mitigation options.

The first study commissioned by Ecology is a "Feasibility Review of Existing Public Water Systems in the Carpenter-Fisher and Nookachamps Subbasins" to identify if existing public water systems could provide water solutions. RH2 Engineering, Inc., (RH2) completed the draft

feasibility report in December 2012 evaluating nine public water systems in the region and identifying five potential projects that could provide water.

The projects identified include:

- Direct water service expansion in the upper reaches of the Nookachamps and Carpenter-Fisher.

- Piping water into the upper reaches of Fisher, Carpenter, and Nookachamps creeks, to augment flows and mitigate the use of wells downstream.

Preliminary cost estimates for these projects range from $500,000 to $12,000,000. The total project cost estimates (including operations and maintenance costs) indicate the lowest cost projects in both the Upper Nookachamps and Carpenter-Fisher subbasins are the mitigation-centered options. These options, if implemented, would provide relief to some, but not all, property owners within these subbasins.

The primary driver for capital costs is the length of water main needed. Due to the dispersed nature of the potential lots that need water, creating or expanding a municipal distribution system to serve them will always be more costly than providing mitigation water to a few stream channels and having the benefits carry all the way to the mouth of the stream. (Another study, evaluating costs of water supply options in the Skagit included preliminary cost estimates for water service expansion that range from approximately $48,000 to $55,000 per household. Mitigation water costs ranged from approximately $15,000 to $17,000. (Ecosystem Economics, DRAFT Strategy Paper for the Skagit Water Exchange, July 2015)

The second study, a "Skagit Basin Municipal Water Right Assessment," was completed by RH2 in February 2015. This study assessed municipal water rights upstream of Sedro-Woolley for the purpose of determining if and how any of the water right holders might be able to help meet growth in the watershed through direct water service or through donation or sale of a portion of their water rights to provide mitigation. This study focused on the status and availability of water rights for further consideration and did not identify potential projects.

This study recommended further discussion with three municipal water right holders with historically perfected water rights in excess of projected demand at full build-out in their current service area. These excess perfected water rights are due to changes in water use within their community, such as the loss of a large industrial use. Two other municipal water systems with similar excess water rights indicated they preferred to retain all their water rights for future growth and were unwilling to provide a portion for mitigation of permit-exempt uses.

Five water systems were identified that might be capable of expanding their service area to include adjacent properties, based on their inchoate water rights and willingness to update their water system plans. However, substantial infrastructure upgrades may be needed to actually serve that water to particular parcels.

Fifteen smaller scale water systems were identified that will likely not be able to provide water outside of their original service areas or original places of use. However, based on current numbers, these systems are capable of supplying water to an additional 633 connections within their existing service areas.

Direct water service expansion

Cost is the major consideration for water service expansion, but there are other significant considerations. Extending water service lines outside of existing service areas will require Department of Health approval of an amended Water Supply Plan. If service is being extended beyond the Urban Growth Area (UGA) boundary, compliance with Growth Management requirements, and possibly an amendment of the UGA boundary is needed. Some community members have expressed concern that extending water service will result in much higher growth levels in these areas and loss of the rural character of the Skagit watershed.

In 2015, in response to legislative inquiry, Ecology and Skagit PUD analyzed the cost of possible waterline extensions into the watershed. A total of 21 projects were identified with draft planning-level cost estimates ranging from $600,000 to $12.3 million. The grand total amounted to $108 million and 105 miles of waterline.

The number of potential households served varied widely for each project. As an example, the South Conway extension project has an $8 million cost estimate and could serve a higher density of parcels than most of the projects. 139 parcels needing water are within 200 feet of the possible main line extension (17 homes that relied on the invalidated reservation, and 122 parcels without homes). Simple division puts the cost per parcel at approximately $57,500. This analysis did not consider whether sufficient water rights are available for a full "build-out" of these areas. These estimates did not include costs of other requirements such as storage and booster pump stations, permitting, land acquisition, improvements to the existing water system, or use of existing interties with the city of Anacortes water system.

Advantage:

- Provides reliable water supply to new users without increasing consumptive use impacts to flow sensitive tributary streams.

Disadvantages:

- Costs are very high and the source of funding for these projects is not known.
- The low density for new hookups and resulting lack of positive return on capital investment gives direct water service expansion little appeal as an alternative.
- Getting the necessary permits and approvals is uncertain.
- There will likely be some community opposition to this approach.

Mitigation relying on public water supply as a source of water

There are two ways that public water supply could enable mitigation of new permit exempt withdrawals: by placing senior water rights into trust or by piping water into the upper reaches of creeks to augment flows. Placing a senior water right into trust can provide a fairly straight forward offset for new uses that will affect instream flows downstream from the point of withdrawal of the original water right. Discussions are underway with public utilities that own senior water rights on the main stem of the Skagit River. Ecology is optimistic that sufficient water rights may be acquired to offset the impacts of permit-exempt withdrawals in hydraulic continuity with the mainstem of the Skagit River.

Piping water to augment flows will require funding to cover construction of the pipeline and an entity to operate the flow augmentation system. It is also important to address water quality considerations and how this might affect the homing and imprinting on juvenile fish for returning to their natal stream.

The City of Anacortes put forth a conceptual pumped flow augmentation strategy. It involved running pipelines from the Skagit mainstem up the tributaries and building storage tanks for release of water into creeks during low flow period to mitigate for users in the tributary subbasins. A planning level cost estimate for the Coal Creek subbasin totaled $450,000.

Advantage:

- Where available it provides a direct offset for the consumptive use impacts of new permit exempt withdrawals.

Disadvantages:

- The source of funding and a reliable operator for a piped flow augmentation project are not known and would be essential to ensure operational success in perpetuity.

Instream Flow Setting Methods

Evaluation of instream flow methods

The purposes of instream flow methods include: (i) to identify flow levels which either maximize or provide some other acceptable level of benefit, or (ii) to determine change in benefit with a change in flow. Methods in the first category (i) are called standard-setting methods, and those in the second category (ii) are incremental.

The choice of instream flow method depends on the question to be addressed and the cost—in both time and money—to use the method. Fish and fish habitat are often used as the measure of instream benefit, and most instream flow methods address fish habitat. Fish are more dependent on flow than many other instream values because their use of flow is not discretionary; it is a necessity. Although there are ways to assess instream flows needed to meet various aspects of water quality, recreation, aesthetics, and navigation, the following discussion focuses on fish.

Many, but not all, instream flow methods for fish are discussed in Instream Flows for Riverine Resource Stewardship (Annear, et al. 2004), and global instream flow method use was enumerated and discussed by Tharme (2003). New approaches are being developed frequently, usually as amendments to existing methods. Direct relationships between flow and numbers of fish are rarely determined in instream flow studies, but a few cases allow cross-assessment of different methods. (Relationships between flow and fish have been extensively studied, and partial reviews are available in Beecher 1990, Annear et al. 2004, Locke et al. 2008, and Arthington 2012.)

Incremental instream flow methods attempt to assess the product of habitat quantity and quality at different flows in the same channel. Habitat quantity is usually measured as area (surface area or plane view of stream) or as volume of habitat. Habitat quality is a product of spatial distribution of hydraulic variables (depth and current velocity) in relation to stream bed material (substrate), stream channel form (e.g., undercut banks, pools, riffles, cascades, and waterfalls), and objects in the stream channel (boulders, logs, log jams). A given fish species and life stage prefers or avoids different depths and velocities, and other channel features; and these preferences are part of habitat quality. Stream habitat quality is also influenced by water quality (temperature, turbidity, and chemical content, including dissolved oxygen), and many aspects of water quality are themselves influenced by flow. Habitat quality strongly influences how many fish can be produced in a given quantity of habitat.

No instream flow method models all the potential components of fish habitat, although IFIM (Instream Flow Incremental Methodology) is a framework for considering all of these components. According to Professor Angela H. Arthington (2012: 142), "The IFIM … is still considered by many practitioners to be the most scientifically and legally defensible suite of methods available for assessing environmental flows (Gore and Nestler 1988; Dunbar et al. 1998)." IFIM, with PHABSIM (Physical HABitat SIMulation) as a primary component, is the preferred method for the departments of Ecology and Fish and Wildlife, but the cost in time and effort makes it less suitable for multiple concurrent assessments.

Most instream flow methods involve hydraulic components and fish habitat components. Hydraulic components (depths, current velocities, widths, wetted area, and volume) are related to flow in a given channel. Habitat is then related to one or more hydraulic components. Habitat is estimated by measuring what ranges of hydraulic components are selected (e.g., Beecher et al. 1993, 1995). Recently, Rosenfeld, and Ptolemy (2012) have explored incorporation of physiology (bioenergetics) into habitat suitability to give a more accurate indication of the influence of flow on fish. Although, their investigations have not yet been developed to the stage of a usable method, their findings generally agree that flow is a limiting factor for fish.

Some relatively low cost instream flow methods use general trends in the relationships between hydrology, hydraulics, and fish habitat. These include the toe-width method (Swift 1976, 1979) and the Tennant (1976) method. Tharme (2003) found the Tennant method to be most-used worldwide. Ronald Ptolemy (British Columbia Ministry of Environment, personal communication) also found the Tennant Method to have strong support for British Columbia salmon and trout.

In Washington State, the two most commonly used stream flow study methods are:

- Instream Flow Incremental Methodology (IFIM)/Physical Habitat SIMulation (PHABSIM)
- Toe-Width

Other instream flow study methods have been used at the request of the local planning unit or for site specific reasons. More often, WDFW uses these alternative methods to inform water right processing decisions or SWSL recommendations. These other instream flow study methods include:

- Wetted Width
- Toe-Width
- Hatfield and Bruce
- Tennant
- Tidal Distributary/Estuary Method

Below, we provide further details on each of the instream flow methods mentioned above.

Instream Flow Incremental Methodology (IFIM)/Physical HABitat Simulation (PHABSIM)

The Instream Flow Incremental Methodology (IFIM; Bovee 1982, 1995, Stalnaker et al. 1995, Bovee et al. 1998) considers multiple aspects of stream fish ecology and hydrology and is generally founded on PHABSIM. IFIM is used nationwide. Most water resource managers consider IFIM as the best available tool for determining the relationship between stream flows and fish habitat (living space). The method is relatively time-consuming and expensive, and is therefore best used for rivers with a high potential for controversy.

IFIM uses computer modeling to calculate the volume of fish habitat available at various stream flow levels. It is based on the understanding that fish prefer water with a certain depth and velocity (how fast the water is flowing), as well as other habitat features, such as cover, bed material, and so on. These preferences vary for different species of fish, and for each of their life stages.

PHABSIM relates stream channel hydraulics at a specific stream reach to flow, then uses this relationship to calculate habitat. Habitat suitability criteria is based on what habitats are available and what habitats are actually used (e.g., Beecher et al. 1993, 1995); this may be done concurrently with a PHABSIM study or independently. (In the early history of PHABSIM –

1970s and 1980s – there was debate about whether use [frequency distribution] or preference [accounting for availability] was more appropriate, but Beecher [1995] resolved this debate in favor of preference.)

Steps in a typical PHABSIM study include:

(i) Identifying a study site that represents typical or most flow-sensitive areas in a stream reach of interest;

(ii) Determining hydraulic condition distribution around the study site at different flows (usually three) through direct measurements;

(iii) Hydraulic modeling and model calibration to ensure that the computer model produces hydraulic results that are similar to what was actually measured;

(iv) Calculating habitat quantity as Weighted Usable Area (WUA) by combining the hydraulic model with habitat suitability criteria; and

(v) Interpreting WUA vs. flow in light of life history, hydrology, season, and temperature to recommend instream flows by season. WUA is actually an index of habitat quantity x quality.

Toe-width

The Toe-width method is based on the relationship between the stream flow that produces the most fish habitat (calculated from field measurements and fish preferences similar to those used in a PHABSIM study) and a simple measurement of stream width at the toe of each stream bank (toe-width or toe-of-bank width). The "toe-of-the-bank" is the point where the stream bed or bottom meets the stream bank. This quick method uses measured stream channel width and species-specific preferences to calculate a stream flow level to effectively protect salmon and steelhead spawning and rearing.

Most of the over 250 instream flows set by rule in Washington State were done with Toe-width. Toe-width estimates have compared well with IFIM results and so are generally adequate for management purposes.

For more information, refer to these two scientific references on how the Toe-width method was created:

- Preferred Stream Discharges for Salmon Spawning and Rearing in Washington
- Estimation of Stream Discharges Preferred by Steelhead Trout for Spawning and Rearing in Western Washington

Wetted Width

The Wetted Width method is used to help determine instream flow recommendations for low flow periods, based on adequate fish rearing and migration flows. The method assumes a connection between the wetted width and of the quantity of fish habitat (living space). It involves measuring from water's edge to water's edge over a number of site visits at different flows.

Graphs are developed to show the relationship between actual stream flow and wetted width. There can be a clear point where the graph levels out – when you're no longer rapidly gaining width with increases in flow. This point is referred to as the breakpoint or "inflection point." It indicates the stream flow above which habitat does not increase as rapidly with increasing flow, although it is not assumed to be an optimal flow or habitat quantity.

Aquatic insects are a major food source for fish, and they are produced on the stream bed. When wetted width reaches the inflection point on the flow vs. wetted width graph, the production area for aquatic insects is maximized and therefore the stream's capacity to provide this food source may be fully realized. This point becomes the stream flow recommendation for rearing (feeding and growing) fish.

The technique was modified by Dr. Hal Beecher (Washington Department of Fish & Wildlife) who added a measurement of width where depth is at least 6 inches, the minimum depth for yearling and older trout and salmon. Plotting width over which depth is at least 6 inches as a function of flow provides an indication of rearing habitat (living space, rather than just food production). Young salmon and trout are seldom found in water shallower than 6 inches (Beecher, et al. 2002, 1995, 1993. Campbell and Eddy. 1988).

Hatfield and Bruce

Hatfield and Bruce developed a series of equations to estimate the stream flow that maximizes the weighted usable area (WUA) based on previous IFIM studies, for up to four life stages of certain salmonids (such as salmon and trout). This method can be done entirely from the office; no field work is required. The user looks up the yearly average stream flow, longitude and latitude for the river, and enters these into equations on a calculator or computer.

This method is a quick, high-level technique using IFIM study results. It does not replace a detailed analysis of a watershed and river.

Tennant

The Tennant Method (sometimes erroneously called the Montana Method) uses hydrological gage data and seasonal percentages of mean annual discharge as an instream flow. It is one of the earliest and most widely used methods worldwide (Tharme 2003), and intensively validated throughout British Columbia (Ron Ptolemy, BC Ministry of Environment, personal

communication). Mr. Ptolemy's validation is based on salmon and steelhead production in relation to seasonal flows as a percentage of mean annual flows.

Tidal Distributary/Estuary Method

Instream flows in the Skagit River were based on results of IFIM/PHABSIM studies integrated with use of the Tidal Distributary/Estuary Method (Annear, et al. 2004: 182-183; Duke Engineering & Services, Inc. 1999). Extensive monitoring data collected and presented by Swinomish fishery biologists made clear that the estuary was essential to salmon production in the Skagit River and that flow influences estuarine rearing habitat. Using this method in conjunction with IFIM/PHABSIM best integrates these values into the flow recommendations. It has not been used elsewhere in Washington.

Recommendations to the Legislature

As the importance of managing water supplies for instream and out-of-stream needs intensifies, mitigation is an important tool to prevent the impacts of new water uses on senior instream flow water rights, including the impacts of permit-exempt withdrawals. The Supreme Court has set strict requirements for protection of instream flows from all junior water users.

Mitigation for permit-exempt withdrawals presents some unique challenges:

- Permit-exempt withdrawals are individually small impacts with the potential for cumulative impacts in certain circumstances (for example a high density of wells in a small fish-bearing tributary).

- New permit-exempt withdrawals are typically dispersed throughout a watershed including parts of the watershed without senior water rights available for mitigation water.

- Due to the dispersed nature of the withdrawals, Ecology's experience has shown that no single mitigation technique will successfully mitigate new permit-exempt withdrawals. A range of mitigation techniques is needed for varied circumstances, even in the same watershed.

- Providing water-for-water mitigation for new permit-exempt water uses may not address the most significant impacts to instream resources from land development. Water-for-water mitigation does not restore existing degraded stream conditions from historic land use practices, such as diking, straightening, channelizing, removing streamside vegetation, and removal of in-channel LWD.

Based on the recent Supreme Court decision in the Foster case, Ecology recommends that the Legislature state its intention clearly through statutory amendment if it intends additional mitigation tools to be available to mitigate impacts from permit-exempt wells, including out-of-time mitigation, out-of-place mitigation, out-of-kind aquatic habitat mitigation, or other approaches.

If the Legislature chooses to authorize a more expansive suite of mitigation tools, including aquatic habitat mitigation, then it would be important to ensure that an ongoing management framework is established that protects and enhances instream resources and watershed functions. Important elements include:

- A decision making process that includes state, local, and Tribal governments; affected senior water right holders; WDFW; and Tribal fisheries managers.

- To identify an entity with the authority to own or manage land that will take on the responsibility for ongoing operation of the mitigation and restoration program.

- Necessary funding to accomplish needed mitigation and restoration projects.

- This could be initiated as a pilot project in the Skagit watershed.

Appendices

Appendix A. References

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Appendix B. Yakima Basin Supplemental Mitigation Projects

Indian Creek Large Woody Debris/Floodplain Restoration

The SwiftWater and Masterson Ranch mitigation banks sell mitigation certificates to new groundwater users located within the Teanaway River basin. In addition to offsetting the consumptive use of each new groundwater use, the mitigation banks need to prevent local flow reduction that would be adverse to fish. The Teanaway is one of the more important salmon recovery areas within the Yakima basin. Salmon, steelhead, and bull trout spawning, incubation, rearing, and migration have been at least partially restored since the first flow recovery efforts were initiated by USBR in 2000. Prior to 2000, water diversions created a physical barrier to passage in August and September in almost all years.

The Teanaway can be characterized as follows:

Limiting Factors
In decreasing order of importance, the main factors limiting production of anadromous salmonids in the Teanaway have been identified as:

- Low flows and associated high water temperatures during the summer and fall in the lower mainstem, the Middle Fork, and the West Fork;

- Loss of natural floodplain function through the lower watershed; and,

- A “flashy” runoff pattern (the Teanaway has a naturally high flow variation due to extent of watershed that is in the rain-on-snow zone; flow variation has been exacerbated by extensive logging in the upper watershed.

Flow and habitat restoration priorities

- Improve streamflow in the lower Teanaway River through water efficiency improvements and purchases that provide permanent flow improvements that reduce water temperature and provide habitat for all life stages of anadromous and resident fish.

- Improve floodplain function and habitat to reduce water temperatures and provide base flow improvement later in the year.

- Improve watershed hydrologic function.

The irrigation season for Teanaway river water rights ends September 15. The irrigation season is based on a court decree from the early 1900s that first confirmed the Teanaway River water rights for the original pre-code water users. The irrigation season was also adopted by the Acquavella adjudication court.

Considering the flow and habitat restoration priorities, Ecology reviewed streamflow data for the Teanaway River nr Forks to determine when the lowest daily average flow occurs. Based on the 2000-2010 water years, the lowest daily flow occurred between August 21 (earliest) and October 6 (latest). Four years had the lowest flow occur after the Sept 15 end of the irrigation season.

Table 3. Flows in the Teanaway River near Forks

Year	Day	Avg. Daily Flow, cfs
2001	Oct 6	11.00
2002	Sept 16	16.00
2003	Oct 6	9.00
2004	Aug 21	12.00
2005	Aug 29	9.00
2006	Sept 9	11.00
2007	Sept 14	13.00
2008	Oct 1	12.52
2009	Sept 2	18.65
2010	Aug 26	25.92

From the preceding table, one can see that retiring water rights alone in the hope that relying only on that action to mitigate September 15 to November 15 flow reductions, would be ineffective. The flow restoration community had done sufficient assessment work to know their

goal was to achieve a target flow of 20 cfs. The conclusion reached by WDFW, YN, and Ecology reviewers was that it would be appropriate to develop a supplemental mitigation program that facilitated offsetting the late-season impacts of year round domestic water use and would be likely to improve both late-season flows and water temperatures.

Supplemental Mitigation Project Description
Yakama Nation, using BPA funds, will construct a large woody debris (LWD) project within the geomorphic floodplain of Indian Creek on a section of land owned by WADNR. This land has been managed to generate revenue for the School Trust, but will soon be incorporated into the new Teanaway Community Forest Trust. This monitoring project will serve as a model or demonstration project to show what landscape and hydrologic changes result from alteration of the floodplain.

Project Goals:

- To identify changes in floodplain connectivity and the surface water-groundwater relationship within the LWD project site
- To identify and record changes in the floodplain landscape, riparian habitat, and aquatic habitat within the LWD project site
- To identify changes in the base flow of Indian Creek
- To identify changes in water temperature associated with the expected habitat, floodplain, and hydrologic changes

Project Objectives:
Collect stream flows and shallow groundwater elevations, surface- and groundwater thermal data, physical measurements of the floodplain cross section and fish habitat, and photographs depicting the landscape at prescribed intervals.

This project will primarily rely on the data generated to assess whether the expected landscape changes, floodplain reconnection, and hydrologic benefits result from the LWD project. There are no specific performance objectives. It will be done within the context of a much larger effort to restore flow and habitat in the Teanaway River basin and the Teanaway Community Forest landscape. The objective is to better understand the quantitative performance of the LWD project with respect to each project goal.

Tillman Creek Flow Augmentation

New Suncadia LLC (Suncadia) operates the most active water bank marketing mitigation certificates to 3rd party purchasers in Kittitas County.

Tillman Creek

Tillman Creek is one of several tributaries to the upper Yakima River that drain the north-facing slope of South Cle Elum Ridge, east of Peoh Point and southwest of the City of South Cle Elum to the confluence with the Yakima River. Most of the upper watershed tributaries appear to go dry after mid-summer. According to WDFW observations made in July 2010, Tillman Creek surface flows above the Moher Road and Westside Road intersection were estimated to be about 2.0 cfs. There was sufficient flow and instream habitat to support cutthroat trout and other small resident species. Anadromous fish are prevented from upstream passage at the KRD – Westside Road crossing (estimated stream mile 1.3) because of a nearly 4 foot vertical drop at a culvert. The only other fish passage obstruction is caused by poor hydrologic connectivity at the mouth of Tillman Creek during the summer low flow period.

Above the John Wayne Trail Bridge, 20 acres of riparian wetlands has a direct surface water connection to Tillman Creek. This is the same wetland and stream channel complex that would receive supplemental flow from the unnamed stream.

The Tillman Creek channel meanders through the land and through a series of instream wetlands and beaver ponds for 0.5 mile before entering the Yakima River. The mouth of Tillman Creek has a direct surface flow connection with the mainstem Yakima River. Due to low flows, hydrologic and habitat connectivity between Tillman Creek and the Yakima River can be poor. WDFW biologists estimated flow at the mouth of Tillman Creek in May 2011 to be 0.2 cfs (LaRiviere, personal communication).

WDFW and Yakama Nation (YN) fish biologists have observed juvenile O. mykiss, coho, and spring Chinook within the Tillman Creek drainage (LaRiviere personal communication). Cutthroat trout and other resident species are assumed to be present throughout the drainage, even above the blockage culvert on Westside Road.

Unnamed Tributary

The unnamed tributary adjacent to the western margin of the Tillman Creek northwestern watershed boundary drains a small subbasin 1.1 square miles in area. Surface water flows originate in small stream channels near the Kittitas Reclamation District (KRD) canal. Channel reaches are steep (greater than 20% slope) in the lower 300 meters of the stream, including immediately upstream of its confluence with the Yakima River. It is very difficult for small and large fish to swim up the steep slope (LaRiviere, personal communication). Additionally a perched culvert with a 12-inch vertical drop results in a severe passage obstruction within 5 meters of the Yakima River. WDFW conducted visual surveys and found no fish or shellfish in the unnamed drainage.

At its mouth, the unnamed stream flows through a culvert under the John Wayne Trail and then immediately into the Yakima River. A small gravel berm separates the Tillman Creek and Unnamed tributary watersheds. The berm functions as the right bank of the unnamed stream and as a portion of the western boundary for the Tillman Creek drainage. A small stream channel is situated within a few hundred feet of the berm. The channel enters into a large wetland complex. The wetland is connected to, and functions as, a left bank riparian area for lower Tillman Creek.

There is a defined channel in the wetland that drains directly into Tillman Creek immediately upstream of the John Wayne Trail Bridge crossing.

The unnamed stream is about one-half mile west of Tillman Creek and currently flows directly into the Yakima River. The stream begins just below the KRD canal and flows north-northeast to the Yakima River. It appears that the unnamed stream was channeled and re- routed directly to the Yakima River through a culvert when the railroad grade was installed more than a century ago.

Supplemental Mitigation Project Description
This flow augmentation project was suggested by fishery biologists from the Washington Department of Fish and Wildlife and Yakama Nation.

Re-route a fishless stream from its current location to a new channel that would join Tillman Creek upstream of the John Wayne Trail. Water will be conveyed from the unnamed stream through a locking headgate with bypass, through a flume into an existing constructed ditch for approximately 50 to 100 yards, across an easement to a wetland that flows into Tillman Creek. The wetland that will receive the diverted stream flow is pre-existing and the existing ditch already discharges to this site.

Project Goals:
- Offset predicted flow reductions to lower Tillman Creek caused by new consumptive use resulting from construction of up to 50 homes upstream of the KRD canal within the Tillman Creek watershed.

- Restore up to 3 cfs to lower Tillman Creek that was lost by the century old realignment of the unnamed creek.

Project Objectives:
- Install a flow splitting structure in the unnamed stream at the bermed channel section of the unnamed creek upstream from the John Wayne Trail.

- Operate the gate structure to ensure the mitigation flow (5 gpm) is re-routed at all times. Set the gate structure to deliver up to 3 cfs when it is determined to be beneficial to fisheries and habitat in lower Tillman Creek.

Suncadia entered into an easement and agreement with Washington State Parks to convey the mitigation water. State Parks entered into a separate agreement (also facilitated by Suncadia) with WDFW and Ecology to re-route up to 3.0 cfs to improve the flow and fish rearing and passage conditions in lower Tillman Creek.

The long-term financial obligations associated with maintenance and operation of the flow splitting structure for rerouting the mitigation flow are the responsibility of the mitigation certificate purchasers. Covenants and conditions water right permits provide for perpetuation of the new water users' responsibilities. Ecology and WDFW, as provided in the State Park's

easement agreement, have assigned their obligations for operations and maintenance to Kittitas Conservation Trust.

Appendix C.
Ecology Water Resources Program Policy 2035

POL-2035 WATER RESOURCES PROGRAM

POLICY EVALUATING MITIGATION PLANS

Contact: Program Development and Operations Support Section

Effective Date: February/20/2013

References: RCW 90.03.255, RCW 90.03.290, RCW 90.03.380, RCW 90.42.100, RCW 90.44.055, RCW 90.44.060, RCW 90.44.100, RCW 90.46, RCW 90.54.010, RCW 90.54.020, RCW 90.74, WAC 173-152, and Appendix H of the DOH/DOE Joint Review Procedures
Memorandum of Understanding.

Purpose: It is Department of Ecology's (Ecology) policy that adverse effects to the state's water resources are best mitigated in-kind, in-time, and in-place. In certain situations, Ecology may accept mitigation that is out-of-kind, out-of-time, or out-of-place. This policy informs water right applicants about the requirements for mitigation plans, and guides Water Resources Program staff in evaluating mitigation plans submitted with applications for new water rights or changes to existing water rights.

Application: This policy describes procedures used to evaluate mitigation plans, the parameters of mitigation proposals, and the types of acceptable mitigation. This policy applies to all mitigation plans related to the approval or denial of water right applications under existing statutes and rules, and does not address the use of permit-exempt wells. Watershed plans that contain provisions for providing water and habitat-related offsets to streamflow depletions have been adopted in some Water Resource Inventory Areas (WRIAs), and in some instances Ecology has incorporated these provisions into instream flow and water management rules. Prospective water users in those WRIAs should consult those WRIA-specific guidance documents and rules.

Definitions

"Adaptive management" means a systematic approach for maintaining or improving resource conditions by observation and monitoring, then applying that knowledge to modify water use or mitigation actions.

"Consumptive use" of water is a use that diminishes the water source,[1] and includes such uses as:

- Transpiration by plants and animals.
- Evaporation that occurs after water has been diverted or pumped from the source.
- Conveyance losses from a reasonably efficient distribution system that do not become return flows.
- Water contained within a product or byproduct.

"Impair" or "Impairment" means to interrupt or interfere with the physical availability of water, or degrade the quality of the water, that would:

1) Prevent an existing water right holder from fully beneficially using the water right;
2) Require an existing groundwater right holder or surface water right holder to make significant modifications in order to beneficially use the water right;
3) For an instream flow water right established by rule, cause the flow of the stream to fall below the instream flow more frequently, for a longer duration, or by a greater amount than was previously the case; or
4) As provided in WAC 173-150, interrupt or interfere with a groundwater right that is withdrawn from a qualifying withdrawal facility (see WAC 173-150-030(7) and (8), 173-150-040, and 173-150-060).

"In-kind" mitigation or "water-for-water" mitigation refers to offsetting the adverse effects of a new diversion or withdrawal with an equal quantity of suitable quality water, such as through retiring or placing into the Trust Water Rights Program an existing water right with comparable consumptive quantity; discharging reclaimed water; through a stream augmentation scheme; or through cessation of a use.

"In-place" mitigation refers to measures whose benefits occur at the same location as the adverse effects of a proposal.

"In-time" mitigation refers to measures whose benefits closely mimic the quantity and timing of the adverse effects of a proposal on a water source. Staff making determinations on the adequacy of the timing of mitigation must consider the existing management framework of the watershed or basin and the effects of timing on a source.

"Mitigation" means measures that offset adverse effects on a water source to eliminate impairment and/or detriment to the public interest.

[1]WAC 173-500-050

"Mitigation plan" is a written document developed by the water right applicant or through joint discussions between a water right applicant and Ecology. A mitigation plan describes the effects of a proposed water use and presents a proposal to alleviate those effects. This plan should also include any assurances needed to ensure the effectiveness of the proposed mitigation.

"Out-of-kind mitigation" refers to mitigating for a new water use by making water quality or habitat improvements, removing fish barriers, or providing other "non-water" improvements as opposed to physically replacing the water lost through the new proposed use.

"Performance based permits" are those that outline specific goals and include conditions or criteria that must be met in order to maintain permit validity under the statutory criteria.

"Pumped flow augmentation" refers to mitigating for a new water use by augmenting streamflow with groundwater that is pumped from a nearby aquifer.

"Reclaimed water" is water derived in any part from wastewater with a domestic wastewater component that has been adequately and reliably treated, so that it can be used for beneficial purposes. Reclaimed water is not considered wastewater.

"Resource management techniques" are enhancements to the natural environment that make water available or offset the impact of a diversion or withdrawal. Creating, restoring, or enlarging ponds, wetlands, and reservoirs, or artificially recharging aquifers, are examples of resource management techniques. Resource management techniques can be acceptable forms of mitigation.

"Return flow" is water diverted or withdrawn for irrigation or other use that returns to the stream or aquifer from which it is diverted or withdrawn, or to some other stream or aquifer, or that would do so if not intercepted by some obstacle.

"Stormwater" is snow melt and rainfall that runs off surfaces such as rooftops, paved streets, highways, and parking lots.

"Stream Augmentation" refers to increasing the quantity of streamflow above what would otherwise occur.

"Wastewater" means water-carried wastes from residences, buildings, industrial and commercial establishments, or other places, together with such groundwater infiltration and inflow as may be present.

"Water banks" are a mechanism to market the transfer of surface water, groundwater, and water storage entitlements that makes water available for new uses.

Background

Water Resources Program staff frequently evaluate mitigation plans submitted with applications for new water rights or changes to existing water rights. Mitigation plans may allow Ecology to approve applications that otherwise would be denied for failure to meet statutory or permitting

requirements. This policy provides guidance on evaluating and implementing mitigation plans, as well as the monitoring and reporting associated with these plans, and clarifies how Ecology reviews mitigation plans in the context of specific statutory permitting requirements.

Mitigation plans can be submitted at the same time that a new water right application or a water right change application is filed. Plans can also be submitted later if the applicant is notified that water is not available or impairment would cause denial of the application. The Washington Water Code currently allows Ecology to approve, but not to impose mitigation for a new water right or & change to an existing water right unless agreed to or proposed by the applicant.[2] Water right applicants may submit mitigation proposals to support an application, such as to avoid impairment or when water would otherwise not be available. In both these cases, Ecology would be required to deny the application if an adequate mitigation plan was not proposed by the applicant and approved by Ecology.

In some areas of the state, specific rules apply with respect to the evaluation and consideration of mitigation. Some Water Resource Inventory Areas (WRIAs) have adopted watershed plans that contain provisions for providing water and habitat-related offsets to streamflow depletions. Ecology has incorporated these provisions into instream flow and water management rules *(see* WAC 173-500). Technical guidance to develop mitigation that is proportionate to the adverse effects of a proposed appropriation has been developed in some watersheds. Prospective water users in areas with adopted watershed plans should consult those WRIA-specific guidance documents and rules.

Although this policy addresses mitigation under the four part test for issuing a water right, other situations may require mitigation. For example, under WAC 173-152-050, some applications may receive priority processing if the proposed use will be nonconsumptive and substantially enhance or protect the quality of the natural environment. The nonconsumptive prong of this two-part test must be met with water-for-water mitigation, but the substantial enhancement prong may be met by other means.

Authority to Evaluate Mitigation Plans

Ecology's authority to accept mitigation plans developed in support of water right applications is found in case law and statute.[20]

- Mitigation plans may be submitted to propose compensatory mitigation within a watershed under RCW90.74.

- Ecology must consider both the benefits and costs, including environmental effects, of any water impoundment or other resource management technique that is included as a component of the application under RCW 90.03.255 or RCW 90.44.055.

[2]See RCW 90.03.255 and 90.44.055.

[3]Case Law includes:
PCHB 05-137 Squaxin Island Tribe v Miller Land & Timber; PCHB 97-146 OHA v. DOE and Battle Mt Gold Company; PCHB NO. 03-155 Burke and Coe v. DOE; and Mountainstar Resort Development LLC; PCHB NO. 01-160 Airport Communities Coalition v. Ecology & Port of Seattle; PCHB NO. 02-037 Pacific Land Partners LLC v. DOE; PCHB 03-030 Yakama Nation v DOE; PCHB 03-155 Mountainstar v DOE; PCHB 96-102 Manke Lumber Co v DOE. Statutes include RCW 90.03.255 and RCW 90.44.055.

- Facilities that reclaim water under RCW 90.46.130 may be required to provide compensation or otherwise mitigate impairment of any existing water rights downstream from any former freshwater discharge point.

- Under SEPA substantive authority, Ecology may require mitigation to avoid adverse environmental impacts (see RCW 43.21C).

- In 2009, Ecology and the Department of Health (DOH) modified the Memorandum of Understanding (MOU) for coordinating review and permitting procedures for public water systems. Appendix H of the MOU outlines how mitigation can be provided that meets public water system reliability criteria.

- Ecology may issue preliminary permits under RCW 90.03.290(2)(a) to require an applicant to provide information on which to base a mitigation plan.

- Mitigation plans may be offered as evidence of a water budget neutral project proposed for priority processing under WAC 173-152-050(2)(g).

- Water rights deposited in the trust water program can be used to mitigate for water resource impacts under RCW 90.42.100(2)(a).

Mitigation Plan Requirements

Mitigation plans must include a structured approach for implementing, monitoring, and maintaining the mitigation for as long as water is withdrawn or diverted. Provisions of the water right authorization will stipulate that it is the water right holder's responsibility to implement, maintain, monitor, and report on the effectiveness of the mitigation proposal.

Mitigation plans must:

- Identify the source(s) of supply for the proposed use and for the proposed mitigation water, if applicable.

- Estimate the consumptive quantity of water that will be depleted by the proposed use from the source requiring mitigation. In the case of a change application, the quantity diverted or withdrawn and used consumptively by the existing use must be established.

- Identify water rights that will be affected by the proposed diversion or withdrawal.

- Be based on a detailed hydrological analysis, which may include an analytical or numerical model.

- Evaluate the reliability of the mitigation proposal, including identification of the sources of uncertainty and how any uncertainties were accounted for.

- Provide a plan for measuring, monitoring, and reporting to ensure compliance with all permit conditions.

- Have contingency measures or an adaptive management plan that will be followed if the mitigation is determined to be inadequate following implementation.

- Identify other permits required to put the mitigation plan into effect.

Evaluation of Mitigation Plans

Ecology evaluates mitigation proposals on a case-by-case basis, relying on the information and analysis provided by the applicant and best professional judgment.

However, other factors must also be considered when deciding if a mitigation plan fully addresses statutory requirements for permitting. For example, new water rights for either surface water or groundwater must meet the four-part test of water availability, beneficial use, public interest (also referred to as being non-detrimental to the public welfare), and impairment.[4]

Ecology considers that water is not available for further appropriations when:

- Water is physically not available, including circumstances where the proposed source does not produce enough water to reliably meet the needs of the proposed beneficial use.

- Water is not legally available at a particular time or place, such as where proposed withdrawals will capture water from surface or groundwater sources that have been closed to new appropriations, or from streams where instream flows are not being met.

- Proposed diversions or withdrawals will cause impairment.

[4]RCW 90.03.290(3) The department shall make and file as part of the record in the matter, written findings of fact concerning all things investigated, and if it shall find that there is water available for appropriation for a beneficial use, and the appropriation thereof as proposed in the application will not impair existing rights or be detrimental to the public welfare, it shall issue a permit stating the amount of water to which the applicant shall be entitled and the beneficial use or uses to which it may be applied: PROVIDED, That where the water applied for is to be used for irrigation purposes, it shall become appurtenant only to such land as may be reclaimed thereby to the full extent of the soil for agricultural purposes. But where there is no unappropriated water in the proposed source of supply, or where the proposed use conflicts with existing rights, or threatens to prove detrimental to the public interest, having due regard to the highest feasible development of the use of the waters belonging to the public, it shall be duty of the department to reject such application and to refuse to issue the permit asked for.

Ecology must deny an application for a new water right when water is not physically available, not legally available, or when a proposed withdrawal or diversion would cause impairment of existing water rights or be detrimental to the public interest. These same tests apply to groundwater changes and transfers, but for surface water changes and transfers the public interest test does not apply. For water right applications that are not exempt from the State Environmental Policy Act (SEPA) process, Ecology may also require mitigation to address identified environmental impacts through SEPA substantive authority. The "State Environmental Policy Act" heading below provides more detail on SEPA and the water right application process.

In certain situations, Ecology may accept mitigation that is out-of-kind, out-of-time, or out-of-place. If an existing water right may be impaired by the proposed new use or change, the owner of the potentially impaired water right can waive claims of impairment or otherwise help shape the form of mitigation. If Ecology determines an application for a water right will not impair another's right, Ecology may issue that water right even if another water right holder does not agree.

The following table indicates the types of mitigation that might be appropriate for given situations.

Table 1: Types of Mitigation Appropriate for Given Situations

Impairment or Circumstance	Is In-Kind, In-Time, or In-Place Mitigation Appropriate?
Impairment -to an existing Water Right	Generally in-kind, in-time, and in-place mitigation is necessary. Mitigation may not be required if water right holders that may be potentially affected waive claims of impairment of their water rights through an agreement with the project proponent.
Impairment- to a State Instream Flow Water Right	Generally, in-kind, in-time, and in-place mitigation is necessary, but in appropriate circumstances involving a benefit to the public, the state may waive impairment to an instream flow through a determination of an overriding consideration of the public interest (OCPI) determination *(see* RCW 90.54.020).
Impairment - to a State-Held Trust Water Right	The terms of the trust agreement determine the state's ability to accept out-of-kind, out-of-time, or out-of-place mitigation for impacts to a trust water right.

Failure of the Public Interest test	Taken as a whole the project must be in the public interest. However, there may be instances where some aspect of a project may be contrary to the public interest, and in those instances Ecology may require mitigation for those effects. There is opportunity for out-of-kind, out-of-time, or out-of-place mitigation to meet the public interest test. In appropriate circumstances involving a benefit to the public, Ecology may make a determination of OCPI.
Failure of the Water Physically or Legally Available tests	When water is not physically and/or legally available, in-kind, in-time, and in-place mitigation must generally be provided. In appropriate circumstances involving a benefit to the public, Ecology may make a determination of OCPI.
To address adverse environmental impacts under SEPA substantive authority	Ecology may require mitigation for identified impacts through SEPA substantive authority.
To qualify as a substantial enhancement or protection of the quality of the natural environment	Some applications may be priority processed if the proposed use will be nonconsumptive and substantially enhance or protect the quality of the natural environment *(see* WAC 173-152-050(2)(c)). The nonconsumptive prong of this two-part test must be met with water-for-water mitigation, but the substantial enhancement prong may be met by other means.
To achieve Water Budget Neutral status	Some applications may be priority processed if impacts are offset by an equal amount of water *(see* WAC 173-152-050(2)(g) and WAC 173-152-020(18)).

Factors to consider when evaluating mitigation plans include:

- Effectiveness of the proposed mitigation
  - Will the mitigation completely offset adverse effects?
  - Will water rights provided for mitigation be protected by placing water into the Trust Water Program?
  - Does the circumstance require in-kind mitigation?

- Timing and/or quantities of mitigation
  - Will the timing and/or quantities of mitigation water eliminate impairment of existing water rights and offset adverse effects during a time of year when water is not available from surface or groundwater sources that have been closed to new appropriations, or from streams where instream flows are not being met?

- Will the mitigation quantities be sufficient and will the mitigation be effective in-time?

- Location of mitigation
  - Will the plan mitigate where the impairment occurs?
  - Will the mitigation be effective in-place?

- Uncertainty and reliability
  - What assumptions and sources of data were used to estimate quantities, locations and timing of adverse effects of the new water use?
  - How representative are any models and assumptions used of actual site conditions?
  - How has uncertainty been accounted for to ensure the mitigation plan is successful?

- Water quality
  - Will the mitigation water be the same or better quality than the water appropriated for the proposed use?
  - Will the mitigation increase the likelihood of adverse water quality effects?

- Sustainability
  - Will mitigation schemes be self-sustaining?
  - If maintenance will be required, will an appropriate management and maintenance plan be in place?
  - Will monitoring plans, performance bonds, or assurances be in place to ensure sustainability of the mitigation?
  - What resources will be available to the applicant to ensure mitigation is maintained?

- Enforceability of the mitigation
  - Will assurances be in place in order for the mitigation to continue during the duration of the proposed water use?
  - What will be the consequences of failure of the mitigation plan?
  - Will agreements, land covenants, or other legal instruments be in place?

- Ecology workload considerations
  - What resources would Ecology require to ensure mitigation is maintained?

- Existing laws, rules, and plans
  - Are there adopted instream flows, closures, or WRIA or Watershed Plans affecting the watershed that need to be considered?
  - Are fish listed under state or federal Endangered Species Act present?
  - Will measures be in place that prohibit water provided for mitigation to be used for any other purpose?

- Review of the mitigation plan by interested parties
  - Have interested parties, such as tribes or other water right holders, had an opportunity to review and provide input on the proposed mitigation plan?
  - Was the mitigation plan adequately described in any required SEPA documentation?

Mitigation Strategies

The following are examples of mitigation strategies that may allow a new permit or change authorization to proceed. In some cases, combinations of these strategies may be necessary.

Water Right Management Strategies

- Transferring a senior water right(s) to offset approval of a junior water right.
- Placing water rights in the State Trust Water Program to offset the proposed use's effects to stream flows or to groundwater levels.
- Using permanent split-season lease agreements with an upstream water right holder to supply instream flows during dry or low flow seasons.
- Acquiring a water right(s) in exchange for approval of another water right.

If a water right or rights are acquired for use as mitigation, the mitigation plan should outline a method of protecting those rights for the duration of the proposed water use. Water rights that are acquired to offset adverse effects or in exchange for approval of a new or changed water right should be placed into the Trust Water Rights Program whenever possible to preserve the priority date and ensure protection. Generally, placing a valid water right used at the same location and at the same time of year (in-kind, in- place, and in-time) into the Trust Water Rights Program is preferred because these measures require active management only to ensure that the water is not taken without authorization. If an acquired water right cannot be protected, it may be necessary to acquire additional rights, develop an adaptive management strategy, or use a combination of other methods.

Not all water rights are equivalent, which may affect their ability to be used as mitigation. The usefulness or suitability of acquired water rights in a mitigation plan can be diminished or eliminated by many factors including:

- If the water right is an undeveloped permit or claim.
- If the water right is subject to a Family Farm Water Act provision.
- If the water right has quantities that are non-additive.
- If the water right is interruptible or has a junior priority date.

Physical Construction Strategies

- Permanent system changes that redistribute water.
- Constructing infiltration pond(s) or subsurface infiltration galleries.
- Putting augmentation facilities in place (such as constructing a pumped flow augmentation project).
- Storing surface water or groundwater for release during low flow periods.
- Removing fish barriers.

Monetary Investment Strategies

- Conservation fund to buy water rights (privately funded).
- Habitat preservation easements.

Acceptable Mitigation

A hierarchy of effectiveness influences Ecology's acceptance of various forms of mitigation. Those forms having the greatest chance of offsetting the effects from the proposed water use require the least amount of justification and analysis. Conversely, those proposals with the greatest uncertainty regarding the methods of analyses, long-term effectiveness, comparable benefits, and so on (identified under the heading "Other potential types of mitigation" below), will require greater amounts of justification and analysis and may not be acceptable.

The following list of mitigation strategies is in approximate order of acceptability (the first three preferred) and must be coupled with Ecology's authority in Table 1:

Preferred types of mitigation:

1. In-kind, in-time, and in-place mitigation is always preferred. If the estimated volume or timing or location of the adverse effects is uncertain, the applicant may propose water-for-water mitigation that replaces more than predicted effects. For example, the applicant could propose year-round mitigation when adverse effects may only occur seasonally. Where physical construction is involved (e.g. storage), mitigation of instream effects may be maximized out-of-time in consultation with Ecology and external stakeholders. However, if existing water rights are affected, in-time releases may be required.

2. Water bank mitigation and other forms of pooled mitigation may be considered for out-of-priority water use (i.e. senior rights acquired to serve junior rights). This type of mitigation can also be used to offset adverse effects of permit-exempt well use. Due to the basin-wide changes that occur with this type of mitigation, sophisticated analyses and extensive mitigation plans are typically required.

3. Out-of-time or out-of-place mitigation can be acceptable if it provides an equal or greater benefit to the environment (e.g. a more critical stream reach will have increased flow) than would be achieved through water-for-water or pooled mitigation. If there is uncertainty in the comparability between historical use and the new use, this uncertainty may be managed by the applicant providing a safety factor whereby more water rights than the proposed water use are acquired, or a development schedule with an adaptive management strategy that allows the applicant to prove that the mitigation works through actual implementation. Out-of-time and out-of-place mitigation plans should also be acceptable to the state Department of Fish and Wildlife (WDFW), and the concerns of other interested parties such as affected tribes or senior water right holders should be taken into account.

Other potential types of mitigation:

4. Reclaimed water or return flows (wastewater or storm water) can be used to augment streamflow. The effectiveness of this type of mitigation depends on the artificial maintenance of stream flows and, in the case of reclaimed water, assurances that the reclaimed water will continue to be treated to reclaimed water standards and be of appropriate quality for augmentation purposes. Therefore, it is allowed only where the water budget is well-defined, the risk of failure is very low, and there are sufficient control measures to ensure compliance as long as water is withdrawn or diverted. Wastewater or storm water releases can be considered where properly permitted and where control measures are in place to protect water quality. Reports of Examination, and water right permits and certificates should contain provisions to ensure water withdrawals stop whenever mitigation flows are unavailable.

5. Out-of-kind mitigation could be a "Monetary Investment" strategy. Examples of this sort of mitigation include habitat restoration or enhancement that is protected through a restrictive covenant or easements, for as long as water is withdrawn or diverted. Because of the uncertainty regarding tradeoffs involved in this type of mitigation, the action(s) or investment(s) being offered must represent a clear and substantial benefit to the environment. Ecology should also take into account the potential cumulative impact of additional out-of-kind mitigation proposals affecting the same source. Due to the challenges in evaluating these proposals, Water Resource Program staff should consult with WDFW to seek their agreement. The concerns of other interested parties such as affected tribes or senior water right holders should be taken into account. Use of out-of-kind mitigation likely must be coupled with in-kind mitigation to be acceptable. In appropriate circumstances involving a benefit to the public, Ecology may make a determination of OCPI.

6. Pumped flow augmentation as mitigation is least preferred. First, because pumping the augmentation water itself typically also reduces streamflow, it is more difficult to achieve a true gain. Second, as this type of mitigation depends on a very artificial means of stream flow maintenance, and always includes long term maintenance and operation requirements, there are significant risks that this augmentation will not occur for as long as water is withdrawn or diverted. Pumped flow augmentation must not threaten the sustainable yield of the aquifer or impair other water rights, and is more acceptable as a seasonal, rather than continuous form of mitigation. Pumped flow augmentation can be allowed only where the water budget is well defined, the risk of failure is very low, and there are sufficient control measures to ensure compliance for as long as water is withdrawn or diverted. As effects to streamflow are hard to predict and difficult to measure, proposals should include recommendations to augment streamflow in quantities greater than the estimated effects, especially if the effects are very small.

Some mitigation proposals may involve mixing and matching more than one type of mitigation. Out-of- time, out-of-place, or out-of-kind mitigation may be coupled with water-for-water mitigation to avoid detriment to the public interest or perceived effects under substantive authority of the State Environmental Policy Act (SEPA). When combining different types of mitigation, the applicant may need to submit multiple applications for water right permits, applications to change existing water rights, amendments to pending applications, and SEPA studies or documents, as appropriate.

When evaluating mitigation plans it also must be recognized that some Water Resource Inventory Areas (WRIAs) have rules that differ. Specifically, where Instream Resource Protection Plans (IRPPs) have been established, requirements for issuing permits vary. "Out-of-kind" mitigation may not be an option in some basins. Due to the site specific nature of this issue, Ecology staff will need to provide specific guidance to applicants in WRIAs with adopted IRPPs.

Mitigating Impairment of Existing Water Rights

In its findings for a new water right or change authorization, Ecology will make decisions regarding the adequacy of a mitigation plan's ability to prevent impairment of existing rights. Mitigation may not be required if the owner of the potentially impaired water right waives claims of impairment or otherwise helps shape the form of mitigation. An applicant may consult directly with potentially affected water right holders and negotiate agreements to secure their consent to a proposed project. If an applicant pursues such negotiations, and an agreement is relied upon for issuance of a new use of water or change of use of water, Ecology will require written confirmation from the affected water right holder.

Consultations

Ecology will not render decisions on the adequacy of proposed mitigation plans until all required consultations with external stakeholders have been completed. Water Resources Program staff will consult with other agencies or entities with permitting authority or relevant expertise. Ecology will also consult with tribes in accordance with established policies and procedures and intergovernmental agreements. While acceptance of a mitigation plan by other entities is not a legal requirement for Ecology, it is preferred.

For proposals that affect instream flows, staff will consult with WDFW and affected parties and tribes. In evaluating mitigation for effects on adopted instream flows, Ecology will consider the:

- Particular instream flow.
- Quantity and location of stream reaches affected.
- Quality of the fish habitat affected.
- Fish species affected.
- Water quality effects.
- Volumes affected.

- Timing and frequency of changes to flow regimens.
- Existing watershed agreements.
- Potential reduction in flow, or losses from use of water reserved for future public water supply.
- Instream biological needs.
- Other factors as appropriate.

For proposals concerning public water systems, Ecology will consult with the Departme1:1t of Health (DOH) consistent with Appendix H of the MOU between Ecology and DOH, and coordinate permitting decisions as appropriate.

For proposals where reclaimed water is proposed for mitigation purposes, the Water Resources Program will consult internally with Ecology's Water Quality Program, and externally with the generator of the reclaimed water and DOH.

Ecology will document the results of its consultations in writing, typically in its permitting decision and in its SEPA threshold determination.

Dealing With Risk and Uncertainty

Before a mitigation plan can be approved, Ecology must be confident that the plan will meet the stated objectives. Many mitigation proposals will involve some degree of uncertainty. Identifying, assessing, acknowledging, and accounting for uncertainty often will dictate what must be included in a mitigation plan and what qualifies as acceptable mitigation. Ecology must take into account whether the mitigation actually offsets adverse effects and how easily the plan can be implemented. Ecology may deny mitigation plans that are contrary to the public interest, or that would impair existing water rights, or adversely affect water resources of the state. Where risks and uncertainty are elevated, the applicant may propose higher mitigation ratios (e.g. cessation/retirement of historical water use in an amount that is more than the full measure of the new proposed use).

Water right permitting requires managing for risk to resources and other water rights, and managing for uncertainty in the analysis of those risks and the effectiveness of proposed mitigation. For example, in many areas of the state Endangered Species Act-listed fish species are threatened, and the risks to these resources must be taken into account under the impairment or public interest tests. Various methods of analyses offer different degrees of certainty. For example, many mitigation schemes will be based on conceptual, analytical, or numeric groundwater modeling. Using models to predict the extent and timing of potential adverse effects includes some level of uncertainty. The effectiveness of a given mitigation technique or strategy can also vary. The applicant bears the responsibility of adapting their proposed project to address uncertainty.

In addition, Ecology will consider the:
- Extent and validity of water rights used for mitigation.
- Accuracy of the methods used to measure quantities of water or effects.

- Adequacy of site characterization.
- Completeness and validity of data.
- Long-term effectiveness of the mitigation.
- . Concerns expressed by interested parties.
- Adequacy of financial assurances.

Adaptive Management

Due to the uncertainty inherent in mitigating water right impairment, every mitigation plan must identify actions to be taken if monitoring shows failure of any aspect of the mitigation. An adaptive management strategy that allows an applicant to prove that mitigation works during actual implementation may be appropriate when changing conditions could affect a mitigation plan. When designing an adaptive management process, observation and monitoring is essential to guide actions and produce changes to a mitigation plan. Reactions to adaptive management will typically be specific to a proposal, but may include reduction or termination of water use under specific conditions, or consideration of substitute or different mitigation methods. Formal requests to substitute different mitigation methods can be considered, however Ecology is under no obligation to approve a new or modified mitigation plan.

Financial Assurances

The objective of financial assurances is to ensure operational mitigation over the life of the project. If necessary to address uncertainty and risk, the applicant must provide financial assurances to guarantee that the applicant will have the funds to continue the mitigation in the event of a default. Financial assurances are expected to be in place as long as the underlying water right is in use, but may be required for a time frame determined by Ecology based on adaptive management or documented reduced risk(s) over time. Acceptable mechanisms may include trust funds, bonds guaranteeing performance, irrevocable letters of credit, government securities, or other proof of financial responsibility. The applicant must provide an acceptable level of financial assurance, and the water use documents must contain provisions allowing Ecology to terminate the water use if Ecology determines that mitigation is at risk due to failure to maintain financial assurances.

Performance Based Permits

To address uncertainty and risk associated with mitigated water rights, Ecology may issue performance based permits. Such permits can authorize phasing of a project or tie development limits with proof of mitigation implementation. Ecology will not issue a certificate of water right until satisfied that the mitigation is successful.

State Environmental Policy Act

As a general rule, Ecology's decisions on water right permit applications are subject to the SEPA process, though appropriations of one cubic-foot per second or less of surface water, or of 2,250 gallons per minute or less of groundwater, for any purpose, are categorically exempt from a SEPA threshold determination. This SEPA exemption covers the permit and certain activities related to the water diversion and distribution system *(see e.g.* WAC 197-11-

800(4)). In addition, the legislature has enacted a substantial exemption for certain irrigation projects diverting 50 cubic feet per second or less *(see* RCW 43.21C.035).

Ecology will consider both the benefits and costs to the existing environment when evaluating an application for a new water right, water right transfer, or change to an existing water right that includes a mitigation plan or a resource management technique.[5]

To address environmental impacts for projects that are not categorically exempt from the SEPA process, Ecology may use SEPA to shape mitigation strategies, and solicit comments on mitigation plans. When not the SEPA lead agency, Ecology can submit comments to the lead agency on the adequacy of a mitigation plan. All agencies with jurisdiction may choose to require mitigation for identified impacts through their SEPA substantive authority.

If an applicant proposes a mitigation plan associated with the water right application following approval of SEPA when Ecology is not lead agency, Ecology will contact the lead agency, provide the new information, and request additional environmental review. Ecology may supplement the SEPA record if new environmental impacts are found and mitigation is proposed to address them. Ecology may use SEPA substantive authority to condition the water right decision based on the SEPA document and any comments received whether or not Ecology is the lead agency for the proposal.

Permit Provisions

Ecology will establish provisions based on the required elements of a mitigation plan and include those provisions in any Report of Examination, permit, certificate, or change authorization. These elements must address all actions necessary to implement, maintain, monitor, and report on the effectiveness of a mitigation proposal for as long as water is withdrawn or diverted. These documents must also contain conditions to terminate or suspend a proposed water use if a mitigation plan ends or fails to be effective, or if there is a failure to maintain financial assurances for the mitigation. If a water use is suspended, it may not resume until the mitigation plan can be rendered effective and/or financial assurances are restored.

Every mitigation plan places some burden on Ecology to track, coordinate, and enforce the mitigation to ensure that water is available and existing water rights are not impaired.

[5]As required in RCW 90.03.255 and RCW 90.44.055, Ecology will "take into consideration the benefits and costs, including environmental effects, of any water impoundment or other resource management technique that is included as a component of the application. The department's consideration shall extend to any increased water supply that results from the impoundment or other resource management technique, including but not limited to any recharge of groundwater that may occur, as a means of making water available or otherwise offsetting the impact of the diversion of surface water (or withdrawal of groundwater-RCW 90.44.055) proposed in the application for the water right (or amendment in the same water resource inventory area-RCW 90.44.055), transfer, or change."

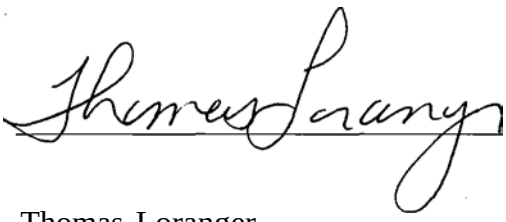
Therefore, provisions should be tailored to reduce effects on staff resources to the greatest extent possible. Some examples of provisions include:

- Stream flow measurement or groundwater level data coordinated with annual metering data submittals due on January 31st of each year.

- Periodic evaluation of mitigation adequacy and compliance with consumptive use limits for public water systems coordinated with water system plan updates due every six years.

- A structured approach for implementing, maintaining, monitoring, and reporting on the effectiveness of a mitigation proposal for as long as water is withdrawn or diverted.

- One-time performance standards (such as submittal of agreements, covenants, and trust water conveyances) under mitigation plans coordinated with permit maintenance schedules already tracked by Ecology, such as Beginning of Construction, Completion of Construction, and Proof of Appropriation, or Project Completion steps.



Thomas Loranger
Acting Program Manager
Water Resources Program

Special Note: These policies and procedures illustrate existing law and encourage consistency to guide water resources program staff in administrating laws and regulations. These policies and procedures are not formal administrative regulations adopted through a rule-making process. Therefore, while this policy provides general guidance, it is not intended to
supersede the applicable statutes and rules or control in all situations where staff may exercise discretion as to how best to apply the law.

The policies indicate Ecology's practices and interpretations oflaws and regulations at the time they are adopted and may not reflect later changes in statute or judicial fmdings. If you have any questions regarding a policy or procedure, please contact the department.